ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 3.] [1908.

XV.—THE NEW ZEALAND SPECIES OF RHODOPHYLLIS.

A. D. Cotton.

The New Zealand species of *Rhodophyllis* are not numerous, nor are they difficult to determine, yet, during recent years, workers in that country have found it no easy task to identify their plants, and practically impossible to reconcile statements made by different writers. This difficulty may be accounted for (1) by the brevity of the diagnoses, and, (2) by the fact that Nos. 371–373 of Harvey's Australian Algae were sent out wrongly named. J. Agardh who, in his Epicrisis, endeavoured to correct Harvey's Algae did but make matters more complicated.

The Kew Herbarium is fortunate in possessing type specimens of all the five species that were originally recorded as occurring in New Zealand. From a study of these it has been possible to gain a clear idea of the species in question, and to detect the errors above referred to. The results of this study are given below.

In the revised descriptions emphasis is laid on the arrangement of the cortical cells. The character of this tissue will be found to be of great value, especially in the case of sterile specimens, in determining the species. Attention may also be directed to the fact that the size of the tetrasporangium varies considerably within the genus ; this, though apparent in the case of the New Zealand species, is even more marked when a wider survey of the genus is taken.

In addition to an examination of the Kew and British Museum specimens, the writer has had the advantage of studying the material in the Herbarium of Mr. R. M. Laing which he kindly sent from Christchurch, N. Z. This collection proved valuable in supplying data as to distribution, and also contained a species hitherto undescribed.

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The following is a revised description of all the species known to occur in New Zealand.

1. **Rhodophyllis acanthocarpa**, J. Ag. Epic., 1876, p. 364 ; De Toni Syll. Alg., 1897, vol. iv., p. 343 ; Laing Rev. List, in Trans. New Zeal. Instit., 1901, vol. xxxiv., p. 341.

Callophyllis acanthocarpa, Harv. in Hook. Fl. New Zeal., 1855, vol. ii., p. 251.

Calliblepharis ? tenuifolia, Harv. in Hook. Fl. New Zeal., 1855, vol. ii., p. 243.

Fronds membranous, of medium size, irregularly dichotomously branched, rosy crimson. Main branches 1–3 cm. wide, linear oblong, margins entire or becoming fimbriate later ; ultimate branches 5 mm. wide, apices usually obtuse. Thallus composed of two distinct layers, an inner of large cells two or more deep arranged parallel to the surface of the frond, and an outer consisting of a single layer of small cells ; from above a rosulate-areolate arrangement is seen, in which the circle of minute cells surrounding the central one appears sub-prominent. Veins absent. Cystocarps marginal, aculeate. Tetrasporangia zonately divided, scattered near the apices of the frond, of medium size 30–50 × 20μ.

Hab. Middle Island on *Ascidia*, *Lyall ;* Jacobs River, *Sinclair ;* Chatham Islands (teste Agardh).

In Flora New Zealand, vol. ii., p. 251, Harvey stated that he was not clear as to the validity of this species, and feared that it might prove to be but a variety of *Callophyllis Hombroniana*. This may be accounted for by the fact that in Lyall's gatherings quoted by Harvey, both species are to be found, and that he did not detect that the true *C. acanthocarpa* possessed a *Rhodophyllis* structure. The two plants are in reality quite distinct and may be recognised even in the sterile state by the structure of the frond. *Callophyllis* may always be distinguished from the present genus by the uniform cortical layer of very minute cells.

The type specimen of *Calliblepharis ? tenuifolia*, Harv., which is at Kew, proves to be but a somewhat luxuriant and proliferous example of *Rhodophyllis acanthocarpa*. The plant has the aspect of *Calliblepharis ciliata*, Kütz., but the structure of the frond and the form of the tetraspores are those of *Rhodophyllis*.

On account of the possession of aculeate cystocarps, *R. acanthophora* is not liable to be confounded with any other species except *R. Laingii* (q.v.)

2. **Rhodophyllis Laingii**, *Cotton*, sp. nov.

R. acanthocarpae similis sed frondibus crassioribus, et aspectu distinctissimo rosulato-areolato differt.

Species submembranacea, ampla, pinnatim ramosa. Rami 1–2 cm. lati, vix attenuati, obtusi, margine ut videtur integro, aut in plantis cystocarpiferis dense fimbriato. Frons duobus distinctis cellularum stratis contexta, cellulis interioribus majoribus per duas series frondis plano parellelas dispositis, cellulis corticalibus minutis, aspectu rosulato-areolato a superficie. Venae

nullae. Cystocarpia ad basin fimbriarum, prominula, echinata fimbrillis indivisis vel multifidis. Tetrasporangia ignota. Color roseus.

HAB. Timaru, *Laing*, 1245.

The above diagnosis is founded on a single but very fine specimen sent by Mr. Laing. Allied to *R. acanthocarpa*, J. Ag., in its structure and aculeate cystocarps, *R. Laingii* differs from that species in possessing larger and thicker fronds, together with a more clearly marked rosulate-areolate arrangement of the cortex. The degree and manner of branching would also appear to be somewhat different from that species, though until more material is forthcoming it is impossible to speak definitely as to this. In the specimen examined there is one main frond, about 2 cm. in width, which branches in a simple pinnate manner; the lateral branches are about 1 cm. in width, and attain a length of 7–8 cm.

3. **Rhodophyllis membranacea**, Harv. in Hook. Fl. New Zeal., 1855, vol. ii., p. 247, t. 117; Kütz. Tab. Phyc., 1869, vol. xix. t. 53? J. Ag. Epic., 1876, p. 365; De Toni Syll. Alg., 1897, vol. iv., p. 344, partim; Laing Rev. List, 1901, p. 341; non Harv. Austral. Exsicc. Nos. 371–373.

Halymenia membranacea, Harv. in Lond. Journ. Bot., 1844, vol. iii., p. 448.

Rhodymenia membranacea, Harv. in Lond. Journ. Bot., 1847, vol. vi., p. 495.

Stichophyllum membranaceum, Kütz. in Bot. Zeit., 1847, vol. v., p. 1; Kütz. Spec. Alg., 1849, p. 874.

Euthora membranacea, J. Ag. Spec. Alg., 1852, vol. ii., p. 385.

Dictyopsis fimbriata, Sond. in Linnaea, 1855, vol. xxvi., p. 519.

Frond membranous, of medium size, up to 15 cm. long, irregularly decompound pinnate, subflabellate, red to fuscous red. Root fibrous. Main branches 5–10 mm. wide, irregularly pinnate, margins frequently fimbriate; pinnae narrow, irregularly alternate; ultimate pinnae linnear-oblong, sub-acute, rarely attenuated at the base; axils of branches and pinnae rounded. Thallus composed of two more or less distinct layers, an inner of large cells two or more deep arranged parallel to the plane of the frond, and an outer consisting of an imperfect layer of smaller cells; rosulate-areolate appearance not shown from above; entire thallus densely punctate with small cells containing red-brown contents. Veins absent. Cystocarps of medium size, marginal Tetrasporangia zonately divided, scattered, or more or less collected into groups near the apices of the ultimate pinnae, very large $70 \times 30\mu$.

HAB. Cook's Straits, *Lyall;* East Coast, *Colenso;* Timaru, *Laing*, 1248; Chatham Islands, *Maltby*.

As a result of *R. membranacea*, Harv., being wrongly united with *R. fimbriata*, Harv., and still more so by Harvey's Australian Exsiccatae being sent out wrongly named, this species has become unrecognisable.

The history may be briefly stated as follows. The original Tasmanian specimens (Gunn, No. 1276) sent to Sir W. Hooker

were described by Harvey as *Halymenia membranacea* (1844). A specimen is preserved at Kew. Harvey in his description noted the dot-like markings but regarded them as tetraspores, a mistake which he himself pointed out later. In 1847 when compiling his list of Tasmanian Algae he records the plant as *Rhodymenia membranacea*. Kützing, in the same year, having seen an authentic specimen, considered it the type of a new genus, and named it *Stichophyllum membranacea*. This name he retained in his Species Algarum in 1849. In the Flora of New Zealand (1855) Harvey records the plant as gathered by Lyall and Colenso in that country; specimens from both of these collections are at Kew, and they agree in all respects with the type specimen from Tasmania. Harvey's description and figure in Fl. New Zeal. is excellent. Up to this date there is no difficulty. In 1860, however, Harvey in Flora Tasmaniae united *R. fimbriata* with *R. membranacea*. This was an error. *R. fimbriata*, Harv. and Hook., though resembling in appearance certain forms of *R. membranacea*, shows a different structure in that it possesses veins and has no dark cells. About the same time Harvey's Australian Algae were issued. In this magnificent series *R. membranacea* is particularly unfortunate. No. 372, in reality *R. tenuifolia*, is labelled *R. membranacea* (Kew and British Museum specimens examined). This was possibly an accident arising from the similarity of meaning in the two names. No. 371, bearing the same label, consists of *R. fimbriata* & *R. Gunnii*, Harv.; whilst 373, named *R. membranacea* var. *elongata*, Harv., may possibly be a variety of *R. fimbriata*, but is certainly not one of *R. membranacea*.

In 1876 J. Agardh published his Epicrisis and detecting inconsistencies in previous work endeavoured to put matters straight. He rightly removes *R. fimbriata* from *R. membranacea*, but wrongly, in the opinion of the writer, unites it with his own species *R. ramentacea*. For *R. membranacea* he quotes Harvey's Australian Algae Nos. 372 and 373, and apparently takes these as his guide in describing the species. Consequently he finds himself at variance with Harvey's figure and diagnosis in Fl. New Zealand, and therefore excludes it from his description. Basing his diagnosis on two exsiccatae, neither of which represented the plant in question, it is little wonder that he went astray. Later writers have accepted Agardh, and the plant has thus been lost sight of.

The brown colour, shaggy habit, and punctate thallus are good macroscopic characters by which to recognise the present species. In structure it approaches *R. Gunnii*, but is separated from it by the characters noted under that species.

R. membranacea appears to be abundant on various parts of the New Zealand Coast, and also in the Chatham Islands. Australian and Tasmanian species are not numerous in European Herbaria.

4. **Rhodophyllis Gunnii**, Harv. in Fl. New Zeal., 1855, vol. ii., p. 247; J. Ag. Epic., 1876, p. 366; De Toni Syll. Alg., 1897, vol. iv., p. 345; Laing Rev. List, 1901, p. 341.

Laurencia? membranacea, Harv. in Lond. Journ. Bot., 1844, vol. iii., p. 443.

Cladhymenia? Gunnii, Harv. in Lond. Journ. Bot., 1845, vol. iv., p. 540 ; Ner. Austral., 1847, p. 87, t. 32 (inexacte) ; Kütz. Tab. Phyc., 1867, vol. xvii., t. 94.

Callophyllis Gunnii, Kütz. Spec. Alg., 1849, p. 746.

Enthora Gunnii, J. Ag. Spec., 1852, vol. ii., p. 386.

Frond very delicate, membranous, large, up to 20 cm. long, pinnate to compound pinnate, pale rosy purple. Main branches 2–3 cm. wide, deeply pinnate or bipinnate, margins entire rarely fimbriate, apices obtuse. Pinnae irregularly alternate, distichous ; lower ones small, narrow, pointed ; upper longer, often compound, apices obtuse. Thallus-structure similar to that of *R. membranacea*, cortex poorly developed, rosulate-areolate arrangement not visible, slightly punctate with cells containing brown colouring matter. Cystocarps marginal. Tetrasporangia zonately divided scattered in the upper segments of the frond, large, 70 × 30μ.

HAB. Preservation Harbour, Chalky Bay, *Lyall.*

The greater size, more delicate texture, and blunt apices usually suffice to distinguish this plant from *R. membranacea.* It is, however, allied to that species and closely resembles it in microscopic characters. The poorly developed cortex, the absence of an areolate arrangement, the large tetraspores, and the presence of dark cells are all in agreement with *R. membranacea.* The dark cells in the present species are, however, less abundant and usually of larger size. In both species these bodies are more obvious in some specimens than in others.

5. **Rhodophyllis lacerata**, Harv. in Hook. Fl. New Zeal., 1855, vol. ii., p. 247 ; J. Ag. Epic., 1876, p. 366 ; De Toni Syll. Alg., 1897, vol. iv., p. 345, sub *R. membranacea*, Harv ; Laing Rev. List, 1901, p. 341.

Frond very delicate, membranous, of medium size, rosy crimson. Branches 1–3 mm. wide, elongated, entire, pinnate or dichotomous ; ultimate branches 1–2 mm. wide, linear, very elongated, apices acute, often bifid ; axils of branches rounded. Thallus composed of two distinct layers, an inner of large cells, two or more deep, arranged parallel to the surface of the frond, and an outer consisting of a single layer of small cells ; a rosulate-areolate arrangement is seen from above. Veins absent. Cystocarps and tetrasporangia unknown.

HAB. On rocks, Port William, South Island, *Lyall;* Otago Harbour, *Laing*, 1246.

This plant remains little known. The only previous record is that of the single specimen gathered by Lyall which is now at Kew. The vegetative structure is identical with that of *Rhodophyllis*, and resembles very closely that of *R. acanthocarpa.* There is little doubt that the specimen represents an attenuated form, similar to those that are frequently produced in species of *Nitophyllum.* What the character of the normal form is it is impossible as yet to say, the only known species to which it in any way approaches is, as stated above, *R. acanthocarpa*, J. Ag.

Laing's specimen is precisely similar to that of Lyall, and is also sterile.

SPECIES EXCLUSAE.

Rhodymenia fimbriata, Hook. & Harv. in Lond. Journ. Bot., 1847, vol. vi., p. 405.

Rhodymenia fimbriata, Hook. & Harv., though a true *Rhodophyllis*, has never been published as such. It was included by J. Agardh as one of the synonyms of the New Zealand *R. membranacea*, but it is, as shown above, quite a distinct species. There is no evidence to prove that *Rhodophyllis fimbriata* (nov. comb.) occurs in New Zealand.

Rhodophyllis ? angustifrons, Harv. in Hook. Fl. New Zeal., 1855, vol. ii., p. 247 ; J. Ag. Epic., 1876, p. 368 ; Laing Rev. List, 1901, p. 341.

An examination of the type specimens shows that the frond possesses the structure of the genus *Callophyllis*. The plant is probably an elongated form of *C. coccinea*, Harv.

Rhodophyllis erosa, J. Ag. Alg. Mar. Nov. Zeal., 1877, No. 182 ; Epic. 1876, p. 695 ; Laing Rev. List, 1901, p. 341. A species now known as *Craspedocarpus erosus*, Schmitz.

Rhodophyllis chathamensis, Cotton, Kew Bull., 1907, No. 2, p. 40.

This species also must be regarded as a synonym of *Craspedocarpus erosus*, Schmitz.

The genus *Craspedocarpus* was separated from *Rhodophyllis* by Schmitz (Syst. Uebers. Florid., p. 8 ; Engler Pflanzenfamilien Teil i., Abt. 2, p. 375) on account of certain structural peculiarities of the frond and cystocarp ; he refers to *Callophyllis erosa*, Harv., as a synonym. The original gatherings of the latter plant contain two, if not three, distinct species, viz. *Callophyllis Hombroniana*, Mont., *Craspedocarpus erosus*, Schmitz, and a third plant allied to *C. Hombroniana* but apparently distinct from it. The writer by not observing the double nature of the original New Zealand specimens, formed (Kew Bull. *l.c.*) the new species *Rhodophyllis chathamensis*.

XVI.—BANANA CULTIVATION IN EGYPT.

Mr. T. W. Brown, whose appointment as Secretary of the newly formed Horticultural Society at Ghizeh near Cairo was recorded last year (*K.B.*, 1907, No. 1, p. 18), has kindly sent us the following article on the cultivation of bananas in Egypt. If the industry is at all likely to meet with the measure of success there indicated it would appear to be worthy of serious consideration.

Although bananas have long been grown in Egypt it is only within recent years that their cultivation has been carried on systematically in large plantations. This was owing greatly to the fact that all the kinds known in the country were of tall

growth and unable, when planted in the open, to withstand the north winds which tear the leaves to shreds in winter. It is therefore the custom to plant these tall varieties in the shelter of a wall, where in most cases they are left to take care of themselves. The most common kinds grown in this way are those known locally as the "Beledi" and "Americani." The former is a black-stemmed variety of *Musa sapientum*, growing about 5 metres high and producing a thick, round and rather short fruit of excellent quality. The "Americani" is a form of the plantain (*M. paradisiaca*) common throughout the tropics. In Egypt it is usually eaten by the natives as a sweet banana without being cooked. In height and habit it resembles the "Beledi" but is easily distinguished by its light-coloured stem. The fruit is from 25–30 cm. long and is produced in large bunches which require to be supported on forked poles to prevent the stems being broken by the weight.

The Lady's Finger banana (another variety of *M. sapientum*) is also grown to a small extent in Egypt but the fruit is inferior in quality to that of the "Beledi" and is seldom seen in the market.

M. Ensete and *M. rosacea* are occasionally met with in gardens as ornamental plants.

From a commercial point of view however the most important species is the Chinese banana. This, although of comparatively recent introduction, is now common throughout the country. Owing to its dwarf growth it is much less subject to injury from the north wind which prevails in winter. In fact it is the introduction of this species which has made the cultivation of bananas on a large scale practicable in Egypt. No figures are available as to the area of land at present devoted to the crop, but plantations ranging from one to twenty feddans* exist in the province of Galioub, and in the vicinity of Alexandria, &c. The amount of fruit is not however sufficient to supply even the home markets. Considerably more than £E. 13,000 worth of bananas were imported during the year 1906. The growth of the industry was arrested some three or four years ago by the attacks of an eel-worm in the plantations at Alexandria. Fortunately this pest has almost disappeared and will probably give little further trouble, if a systematic course of transplanting is followed and over-watering is avoided. On moderately light soils water is required every five or six days in summer and every nine or ten days in winter.

On good soil the plants may occupy the ground for six years.

The best growers prepare the ground for planting in the following way. After it has been ploughed, holes are dug three and a half metres apart, one metre wide and about 75 centimetres deep. A layer of coarse leaves or stable-manure 25 or 30 centimetres in thickness is placed at the bottom of the hole, which is then filled to near the top with a compost half of manure and half of soil. The land is then irrigated, and three or four days afterwards one sucker is planted in the centre of each hole. After planting, the soil is so disposed that each row of bananas stands

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* One feddan = 4,200 square metres.

in the middle of a shallow trench about one and a half metres wide. The water is thus distributed evenly between and around the plants. Needless to say, the stronger the suckers are when planted the more quickly is the plantation established.

The best time for planting is from the middle of February until the middle of April.

In the choice of a site for a plantation the main point is to see that it is sheltered. Although there are some excellent plantations growing in the interior without shelter, and the plants quickly recover in spring from any injury received in the winter, it is nevertheless desirable that the damage may be as slight as possible ; otherwise the size of the bunches is greatly diminished. If the situation is not naturally sheltered, this is easily remedied by planting wind-breaks of the common *Casuarina* (*C. equisetifolia*). Some growers bend part of the leaves over the heart of the plant as a further protection from the slight frosts which sometimes occur in December and January.

In the matter of soil the banana is not particular, but grows equally well on yellow or on black loam, provided it is well drained and cultivated. Experiments made in growing bananas in specially prepared holes on the sandy ground at the edge of the desert have not hitherto succeeded.

The cost of establishing a plantation varies, of course, according to the distance which the manure has to be transported, and the rate of wages paid to the workmen. If we reckon 1*s.* per day as the rate of wages of the men who do the heavy work, and 7½*d.* per day for the boys who carry the manure, suckers, &c., it works out at about £12 15*s.* per feddan. This is made up as follows :— Labour, including ploughing, £4 12*s.* 6*d.* ; cost and transport of manure, £1 ; cost of 342 suckers at 5*d.* each, £7 2*s.* 6*d.* As the plants multiply rapidly the last item may figure on the estimates for the first year only, suckers for subsequent plantations being taken from that first formed. The cost of establishment is then reduced to about £6, including the expense of digging the suckers. During the first summer and winter, catch-crops of cucumbers, water melons, French beans, tomatoes, &c., are grown between the rows, the returns from these being sufficient to cover the initial expenditure and the cost of upkeep until the bananas come into bearing. In plantations started in February and March the first bunches are cut in December, the majority of the bunches are however not ready for cutting until the following February. During the second and subsequent years it is usual to leave four fruiting stems to each plant. These should be as far as possible of different ages, so that all the fruit may not be produced at the same time.

The cultivation of bananas in Egypt is at the present time extremely lucrative. Sold on the plants, they bring from £80 to £120 per feddan per year. If cut and sold by weight, when green, the minimum wholesale price is 8¾*d.* per oke.* Putting the minimum weight of the bunches at four okes, four bunches to the clump per year, and 342 clumps to the feddan, a short calculation

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* One oke = 2 lbs. 12 ozs.

will suffice to show that enormous profits are derived from this crop, even when we reckon £35 as the cost of upkeep. Counting £15 for rent, and £6 per feddan for water, the above figure allows £14 for labour, manure and other expenses. This of course is a high estimate. If the soil is at all poor the plants require two dressings of stable-manure per year—in February and again in July. If it is rich loam one good application of manure suffices. As we have already pointed out, the amount of bananas produced in the country is not sufficient to meet the local demand. Enquiries made during the past year in various Mediterranean ports show that there is a great market for Egyptian bananas, waiting to be developed in Southern Europe. There is therefore little danger of over-production for many years to come.

The short distance and the excellent means of transport existing from Egypt to the principal European ports, would make competition with the Canary Islands comparatively easy. The quality of the fruit is superior to that from the Canaries, and was competing successfully even in France, before the appearance of the disease already referred to. The area under cultivation is increasing fast, so that the banana crop will probably be a much more important one in Egypt in the near future than it is at present.

T. W. Brown.

XVII.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECADES XLVII-XLVIII.

461. **Geunsia Havilandii**, *King et Gamble* [Verbenaceae] ; a *G. farinosa*, Blume, caulibus foliisque fulvo-stellato-pubescentibus non farinosis etiam cymis subsessilibus differt.

Arbor? ; rami, ut inflorescentia et folia subtus, fulvo-stellato-pubescentes. *Folia* opposita, ovata vel ovato-oblonga, apice breviter acuminata et mucronata, basi acuta vel cuneata, supra praecipue in costa scabra et hispida, subtus rugosa, stellato-pubescentia et glandulis peltatis tecta, marginibus distanter denticulata, 6–15 cm. longa, 4–6 cm. lata, costa crassa prominente ; nervi utrinque 9–11, nervulis transversis conspicuis inter se juncti ; petioli crassi, fulvo-hispidi, 13–17 mm. longi. *Cymae* axillares, pauciflorae, subsessiles, vix petiolis aequilongae ; bracteae minutae, subulatae ; pedicelli breves, graciles. *Calyx* campanulatus, intus glaber, extra strigoso-hispidus ; lobi 5, 1–1·5 mm. longi ; fructifer persistens, complanatus. *Corolla* campanulata, glandulis peltatis lucidis exceptis, glabrescens ; tubus 2·5 mm. longus ; lobi 5, ovati, rotundati, demum recurvi. *Stamina* exserta, filamentis gracilibus, antheris oblongis, 2·5 mm. longis dorso fulvo-glandulosis. *Ovarium* glandulosum, depressum, stylo gracili 5 mm. longo, stigmate breviter 5-lobato. *Drupa* siccitate purpureo-nigra, depressa, 3·5 mm. diametro, 5-pyrena.

MALAY ISLANDS. Borneo; at Sarawak, *Beccari*, 3240; *Haviland*, 3549 K and L; near Kuching, *Haviland*, 889.

462. **Callicarpa Maingayi**, *King et Gamble* [Verbenaceae]; a *C. arborea*, Roxb., foliis obtusis subtus pilis minutioribus aureo-fulvis tectis, corollae tubo longiore et lobis brevioribus distincta.

Arbor; rami juniores tomento aureo-fulvo stellato minute tecti; ramuli crassi, obtuse quadrangulares. *Folia* coriacea, elliptica vel elliptico-obovata, apice rotundata et brevissime acuta vel acuminata, basi rotundata vel subcuneata, lateribus inaequalia, margine subintegra vel undulata, 15–30 cm. longa, 7·5–15 cm. lata; nervi supra impressi, subtus prominentes, utrinque 10–12, marginem versus anastomosantes, nervulis transversis pluribus regularibus; petioli 4–5 cm. longi, crassi, supra canaliculati. *Cymae* multiflorae, rotundatae, ad 8–9 cm. longae et 15 cm. latae; pedunculi crassi, complanati, 2·5–4 cm. longi; bracteae brevissimae, lineari-subulatae; pedicelli 1–2·5 mm. longi, graciles. *Calyx* hemisphaericus, 1–1·5 mm. longus, extra stellato-pubescens, intus glaber, lobis 4 minutis. *Corollae* tubus subcylindricus, 1–1·5 mm. longus, extra densissime stellato-tomentosus, intus glabrescens; lobi breves, rotundati, 1 mm. longi, intus villosi. *Stamina* prope basin tubi inserta; filamenta 4·5 mm. longa, antheris dorso glanduloso-punctatis. *Ovarium* villosum; stylus gracilis, stigmate capitato. *Drupa* parva, nigra, ad 1·5 mm. diametro.

MALAY PENINSULA. Selangor, *Ridley*, 2787; Malacca, *Maingay*, K.D. 1192; *Derry*, 1005.

463. **Callicarpa angustifolia**, *King et Gamble* [Verbenaceae]; inter species peninsulae Malayanae ob folia angusta distincta; ad *C. angustam*, Schauer, speciem insularum Philippinensium magis accedit, sed foliis vix denticulatis et floribus et fructu majoribus differt.

Arbuscula ad 3 m. alta; ramuli, ut inflorescentia et folia subtus, indumento stellato griseo vel ferrugineo adpresso tecti; ramuli obscure quadrangulares. *Folia* subcoriacea, lanceolata, apice attenuate acuta, basi longe attenuata et in petiolo decurrentia, supra glabra, fusca, infra dense griseo-tomentosa, marginibus integra vel aliquanto perobscure denticulata, recurva, 10–18 cm. longa, 2–4 cm. lata, costa crassa, nervis utrinque 9–15 irregularibus, nervulis transversis pluribus; petioli 1·25–2 cm. longi. *Cymae* longae, pauciflorae; bracteae lineari-subulatae; pedicelli brevissimi, articulati. *Flores* caeruleo-punicei. *Calyx* campanulatus, 2 mm. longus, extra dense stellato-tomentosus, intus glaber; lobi mucronulati. *Corolla* calyce duplo longior, extus dense stellato-tomentosa, intus glabra; lobi rotundati, erecti. *Stamina* ad basin tubi inserta; filamenta gracilia, vix exserta, antheris oblongis, utrinque glanduloso-punctatis. *Ovarium* villosum, stylo gracili exserto, stigmate capitato. *Drupa* glabra, globosa, 2·5 mm. diametro, nigro-caerulea, 4-pyrena.

MALAY PENINSULA. Kedah; on Lankawi island, *Ridley*, 8330. Perak; at Ipoh, *Curtis*, 3197; at Batu Kuran, *Scortechini*, 1596; on the top of limestone hills, at 200 to 300 m., *King's Collector*, 7036, 8236.

464. **Premna littoralis**, *King et Gamble* [Verbenaceae]; inter species peninsulae Malayanae foliis prominenter crenato-dentatis deltoideis cordatis insignis.

Arbor parva; ramuli obscure angulati, fulvo-pubescentes. *Folia* chartaceo-coriacea, ovata vel ovato-deltoidea, apice acuminata, basi cordata, sinu 6–12 mm. profundo; supra et infra nervis exceptis glabra, marginibus sinibus exceptis acute crenato-dentata, 10–15 cm. longa, 5–7·5 cm. lata, costa prominente; nervi utrinque 7–9, inferiores 1–2 a basi divaricati, nervulis transversis paucis; petioli 2–4 cm. longi, graciles, puberuli. *Cymae* terminales, corymbosae, 3-chotomae, fulvo-pubescentes, ad 10 cm. longae et 15 cm. latae; pedunculi 2–2·5 cm. longi; bracteae lineares, persistentes, inferiores aliquanto foliosi; pedicelli brevissimi, bracteolis 2 minutis juxta calycem. *Calyx* 2–2·5 cm. longus, extra pubescens, bilabiatus, labio superiore 3-lobo, inferiore 2-lobo. *Corolla* bilabiata, calyce dimidio longior, intus ad faucem tubi dense villosa; labium superum 2-lobum; inferum 3-lobum, lobis omnibus rotundatis. *Stamina* inclusa, filamentis brevibus, antheris reniformibus brevissime 1–2-mucronatis. *Ovarium* subglobosum, depressum, glandulis paucis exceptis glabrum, stigmate bifido. *Drupa* globosa, glabra, carnosa, putamine tuberculato. *Semina* oblonga, utrinque acuta; testa membranacea; cotyledones oblongae, obtusae, cordatae, carnosae, 1·25 mm. longae.

Malay Peninsula. Perak, sea-coast at Matang, *Wray*, 2719.

465. **Premna Derryana**, *King et Gamble* [Verbenaceae]; a *P. interrupta*, Wall., ex Himalaya orientali, paniculas 3–4-spicatas gerentibus et foliis basi subauriculatis differt.

Frutex scandens (?); ramuli teretes, lenticellis rotundis vel ellipticis praediti. *Folia* siccitate membranacea, integra, subsessilia, elliptica vel obovata, apice breviter et obtuse acuta, basi attenuata, subauriculata, utrinque lucentia, glabra, 13–20 cm. longa, 9–10 cm. lata, costa gracili; nervi utrinque 7–8, saepe ramulosi, marginem versus curvati, venulis transversis gracilibus prominentibus. *Cymae* in paniculas terminales 3–4-spicatas dispositae; spicae singulae flores sessiles multos in glomerulis interruptis gerentes. *Inflorescentia* 15–20 cm. longa; pedunculi primarii 5–6·5 cm. longi, secundarii 2–2·5 cm. longi; bracteae lanceolatae, 6 mm. longae. *Calyx* profunde bilabiatus; labium superius in alabastro integrum, deinde bilobum; inferius integrum; tubus extra aureo-pubescens. *Corollae* tubus quam calyx paullo longior; extus glaber, intus ad faucem parce albo-villosus; limbus bilabiatus; labium superum emarginatum, erectum; inferum 3-lobum, lobis obtusis. *Stamina* 4, longe exserta; filamenta puberula; antheris reniformibus, loculis oblongis. *Ovarium* glabrum, depressum, stylo gracili staminibus aequilongo, stigmate bilobo lobis gracilibus horizontalibus. *Drupa* non visa.

Malay Peninsula. Perak; on Larút Hill, *Derry* (*Curtis* 3701).

466. **Premna perakensis**, *King et Gamble* [Verbenaceae]; a *P. trichostomate*, Miq., foliis angustioribus crassioribus, calyce fructifero eximie nervoso et bracteis majoribus distincta.

Frutex scandens; ramuli teretes, glabri, lenticellis paucis. *Folia* chartaceo-coriacea, elliptico-oblonga vel lanceolata, aliquanto obovata; apice acuta, basi subcuneata, utrinque glabra, paullo rugosa, marginibus integra recurva, 7–13 cm. longa, 4–6 cm. lata; nervi utrinque 5–6, supra impressi, subtus prominuli, nervulis transversis pluribus inconspicuis; petioli 1–2 mm. longi, glabri, supra canaliculati. *Corymbi* patentes, fulvo-puberuli, 15 cm. longi et lati, imprimis 3-chotomi deinde 2-chotomi, sessiles vel pedunculis crassis 5–8 cm. longis instructi; bracteae ovato-lanceolatae, inferiores foliosae; pedicelli et flores viridescentes. *Calyx* obtuse quadrangularis, pubescens, nervosus, 1–5 mm. longus, bilabiatus labio superiore bilobo, inferiore integro vel obscure bilobo. *Corolla* infundibularis; tubus 3 mm. longus, in parte superiore dense albo-villosus, subaequaliter 4-lobus, lobis recurvis, ciliatis. *Stamina* ad basin corollae inserta, longe exserta, filamentis complanatis; antherarum loculis subglobosis didymis, connectivo glanduloso. *Ovarium* glabrum, stylo longe exserto, stigmate divaricate bifido. *Drupa* pyriformis. *Semina* ovali-oblonga, complanata.

Malay Peninsula. Perak, in rocky places in forest at 260 to 300 m., *King's Collector*, 7247, 10738; *Scortechini*, 516.

467. **Premna Wrayi**, *King et Gamble* [Verbenaceae]; foliis coriaceis ellipticis acuminatis et corymbis compactis insignis, ad *P. Kunstleri*, King & Gamble, q.v. infra, accedit sed calyce profunde bilobo differt.

Frutex scandens, glabratus; ramuli crassi, obscure quadrangulares. *Folia* coriacea, elliptica vel elliptico-lanceolata, apice sensim acuminata, basi attenuata, saepe inaequalia, utrinque lucentes, praeter pilos in axillis nervorum congestos glabra, integra, 10–20 cm. longa, 5–10 cm. lata; nervi utrinque 6–8, marginem versus curvati, nervulis transversis rectis regularibus; petioli 1–5 cm. longi, supra canaliculati. *Corymbi* densi, compacti, 10–13 cm. diametro, glabrati vel minutissime puberuli; rami inferiores 3-chotomi, superiores 2-chotomi; pedunculus 2·5 cm. longus, crassus; bracteae minimae, lineares, inferiores foliosae; pedicelli 1·25 mm. longi. *Calyx* profunde bilabiatus; labium superum breviter bilobum; inferum 3-dentatum, lobis in fructu patentibus. *Corolla* non visa. *Drupa* obovoidea, 5–6 mm. diametro, putamine rugoso, glanduloso. *Semina* plano-convexa, ovata, 4·5 mm. longa; cotyledones oblongae, carnosae.

Malay Peninsula. Perak; at Tapa, *Wray*, 200.

468. **Premna sterculiifolia**, *King et Gamble* [Verbenaceae]; foliis magnis ovatis membranaceis siccitate rubidis basi truncatis vel cordatis insignis, *P. cordifoliae*, Roxb., affinis sed ab ea corymbis multo majoribus differt.

Frutex elatus, scandens; ramuli teretes, rufescentes, sparse scabrido-puberuli. *Folia* membranacea, ovata, integra, apice acuminata, basi truncata vel paullo cordata, utrinque siccitate rubida, subtus sparse glanduloso-punctata, 10–23 cm. longa, 8–13 cm. lata: costa prominens, supra canaliculata; nervi utrinque 6, subtus prominentes, paria 2 infera a basi patentia, reliqua apicem versus sensim curvata, nervulis pluribus transversis; petioli 5–10 cm.

longi, supra canaliculati. *Cymae* multiflorae, terminales, in corymbis paniculatis magnis patentibus usque ad 23 cm. longis et 20 cm. latis dispositae ; cymulae ultimae congestae ; bracteae lineares, minimae, caducae ; pedicelli breves, graciles. *Flores* pallide viriduli. *Calyx* campanulatus, obscure bilabiatus ; labium superum integrum ; inferum integrum vel obscure dentatum. *Corollae* tubus infundibularis, puberulus, 3 mm. longus, intus ad faucem albido-villosus ; labium superum indivisum ; inferum 3-lobum. *Stamina* exserta, filamentis tortis, antheris ellipsoideis divaricatis. *Ovarium* glabrum, depressum, stylo gracili 6 mm. longo, stigmate bifido. *Drupa* globosa, depressa, siccitate rubra, tuberculata. *Semen* unicum perfectum, obovatum, 2·5 mm. longum ; testa membranacea ; cotyledones carnosae.

Malay Peninsula. Perak ; at Waterfall, *Wray*, 1828 ; *Scortechini* ; *King's Collector*, 3067, 7531, 8373.

Var. **cordata**. Folia basi magis profunde cordata ; inflorescentiae ramuli distantes ; calycis labium superum 2-lobatum ; inferum integrum vel obscure dentatum.

Perak ; *Scortechini*, 273.

469. **Premna Ridleyi**, *King et Gamble* [Verbenaceae] ; facie *P. integrifoliae*, Linn., affinis sed notis plurimis differt : corymbis parvis, calycis tubo subquadrangulari, lobis 4 et corollae tubo gracili.

Frutex scandens, cortice griseo-lucido ; ramuli teretes, fusci. *Folia* chartacea, integra, opposita vel ex utraque pari unum altius ; ovata, ovato-oblonga vel obovata, apice rotundata vel brevissime acuta, basi rotundata vel attenuata, saepe inaequalia, utrinque glabra, 4–7·5 cm. longa, 2–4 cm. lata ; nervi utrinque 6–7, infera 1–2 paria a basi, omnes marginem versus curvati, nervulis transversis reticulatione obscuris ; petioli graciles, 6–13 mm. longi. *Corymbi* terminales, multiflori, fusco-puberuli, 4–12 cm. longi, pedunculis 2–5 cm. longis ; bracteae parvae, linearilanceolatae ; pedicelli brevissimi. *Flores* albo-viriduli. *Calyx* campanulatus, subquadrangularis, pubescens, bilabiatus, labiis bilobis. *Corollae* tubus gracilis, 2·5 mm. longus, tubulosus, intus supra albo-villosus, infra puberulus ; lobi 4, aequales, oblongi, apice rotundati, tandem recurvi. *Stamina* 2 ad faucem corollae tubi, 2 basin versus inserta ; filamenta longe exserta ; antherae parvae, loculis divaricatis, connectivo dorso glanduloso. *Ovarium* glabrum, rotundatum ; stylus staminibus aequilongus, stigmate bifido lobis recurvis. *Drupa* non visa.

Malay Peninsula. Perak, *Scortechini*, 455. Singapore, *Ridley*, 6826.

470. **Premna Kunstleri**, *King et Gamble* [Verbenaceae] ; species distincta *P. Wrayi*, King et Gamble, affinis sed calyce truncato differt ; foliis coriaceis ellipticis obtusis glabris et corymbis magnis patentibus insignis.

Arbor parva vel arbuscula magna, glabra, interdum scandens ; rami crassi, cortice bruneo-purpureo ; ramuli teretes, glabri, raro lenticellati. *Folia* coriacea, elliptica, elliptico-oblonga vel obovata, apice obtusa, abrupte breviterque acuminata, basi rotundata

vel subcordata ; utrinque glabra, siccitate plus minus lucida, marginibus integra, breviter recurva, 10–18 cm. longa, 6–10 cm. lata ; costa crassiuscula, supra impressa, infra elevata ; nervi utrinque 5–7, infra prominentes, ad nervulum intramarginalem arcuatum curvati, nervulis perpaucis transversis ; petioli 1·5–3 cm. longi, teretes, canaliculati. *Corymbi* terminales, patentes, longe-ramosi, usque ad 18 cm. longi, infra 3-chotomi, supra 2-chotomi, glabrati ; pedunculi vel rami primarii 7–10 cm. longi ; bracteae lineares vel lineari-lanceolatae, inferiores foliosae ; pedicelli brevissimi. *Flores* pallide albo-virescentes. *Calyx* cupularis, 2 mm. longus, truncatus vel obscure bilabiatus, fructifer integer, complanatus. *Corollae* tubus cylindricus, 3 mm. longus, intus ad faucem albo-villosus ; limbus bilabiatus, labio infero 3-lobo, lobo medio longiore, ceteris cum unico superiore erectis vel incurvis. *Stamina* paullo exserta, sub fauce corollae tubi inserta ; antherarum loculis rotundatis divaricatis. *Ovarium* glabrum, 4-loculare ; stylus staminibus aequalis, stigmate breviter bifido. *Drupa* obovoidea, striata, 6 mm. longa, 4-pyrena. *Semina* obovata, plano-convexa, testa alba, cotyledonibus carnosis apice retusis.

Malay Peninsula. Perak ; on low ground, under 160 m. in alt, *King's Collector*, 938, 4723, 5949. Malacca ; at Sungei Udang, *Goodenough*, 1350.

471. **Clerodendron lankawiense**, *King et Gamble* [Verbenaceae] ; species *C. Griffithiano*, Clarke, affinis, sed foliis magis lanceolatis longioribus, paniculis terminalibus et calyce intus glanduloso differt.

Arbuscula ramulis scabrido-puberulis obtuse quadrangularibus sulcatis. *Folia* opposita, chartacea, integra, oblongo-lanceolata vel oblanceolata, apice acuta, basi attenuata, utrinque parce scabrido-hispida, infra ad nervos pubescentia, 7·5–10 cm. longa, 1–2·5 cm. lata ; nervi utrinque 8–10, marginem versus acute curvati, nervulis transversis paucis irregularibus ; petioli 6 mm. longi, scabride pubescentes. *Panicula* terminalis, foliosa, pedunculata, thyrsoidea, ad 25 cm. longa et 10 cm. diametro, scabride pubescens, in cymas paucifloras trichotomas desinens ; bracteae foliosae, lanceolatae ; bracteolae parvae, setaceae ; pedicelli graciles, 5 mm. longi. *Calyx* campanulatus, extus scabrido-hispidus, intus glandulis magnis peltatis instructus, ad dimidiam partem tubi fissus ; lobi ovati, ácuti, 5–6 mm. longi. *Corollae* tubus gracilis, pubescens, cylindricus, 12·5 mm. longus ; lobi patentes obovati, labii inferioris trilobi palatus lateralibus longior. *Stamina* longe exserta ; filamenta gracillima, glabra, antheris oblongis 2 mm. longis, loculis parallelis. *Ovarium* rotundatum, obtusum, stylo gracillimo, stigmate brevissime bilobo. *Drupa* non visa.

Malay Peninsula. Kedah ; at Terutan, Lankawi Island, *Curtis*, 3789.

472. **Clerodendron umbratile**, *King et Gamble* [Verbenaceae] ; species *C. penduliflora*, Wall., affinis, foliis latioribus et calycis lobis ovatis cuspidatis distincta.

Arbuscula vel arbor parva, ramulis teretibus fulvis fistulosis. *Folia* membranacea, opposita, integra, plerumque oblonga, obovata

vel oblanceolata, apice abrupte longeque acuminata, basi rotundata vel aliquanto attenuata, utrinque glabra, 20–40 cm. longa, 5–15 c.m. lata ; nervi utrinque 8–12, graciles, par infimum a basi rectum, reliquia curvata in nervulum intramarginalem sinuatum desinentia, nervulis transversis irregularibus : petioli 2·5–7·5 cm. longi, flaccidi. *Paniculae* ex axillis superioribus elongatae, laxae, paullo curvatae, glabrae, 10–15 cm. longae ; pedunculi graciles, 10–18 cm. longi ; rami divaricati, recti, cymulis paucifloris ; rhachis complanata, paullo alata ; bracteae foliosae, lanceolatae, ad 2–5 cm. longae ; bracteolae multae, lineari-setaceae ; pedicelli graciles, puberuli, 2·5–12·5 mm. longi. *Calyx* albus vel viridescens, fructu ruber, glaber vel paullo puberulus, fere ad basin fissus, lobis ovato-acuminatis cuspidatis 15 mm. longis, in fructu accrescentibus. *Corolla* alba, rubro-tincta : tubus gracilis, cylindricus, 10–15 mm. longus ; lobi spathulati, apice rotundati, tubo aequilongi. *Stamina* exserta, filamentis glabris, antherarum loculis parallelis. *Ovarium* rotundatum, obtusum, stylo gracillimo, stigmatis lobis 2 brevibus. *Drupa* nigra, carnosa, globosa, 12·5 mm. diametro, pyrenis 4 vel paucioribus. *Semina* rotundata, 6 mm. diametro, cotyledonibus carnosis.

Malay Peninsula and Archipelago. Perak ; at Kapayong Kinta, *Wray*, 167 ; in dense jungle 1,000–1,100 m., *King's Collector*, 722, 6959, 8268 ; *Scortechini*, 2198 ; *Derry*, 3704, 10,712 ; *Curtis*, 3116 ; at Bujong Malacca, *Ridley*, 9700. Sumatra ; in the Lampongs, *Forbes*, 1333, 1565.

473. **Clerodendron Ridleyi**, *King et Gamble* [Verbenaceae] ; species distinctissima subgeneris Siphonanthi, multis notis a *C. Siphonantho*, Br. differt, praecipue foliis oppositis ellipticis vel ovatis, panicula brevi pauciflora, et drupa rubra nec caerulea.

Arbor parva, gracilis, ad 5 m. alta ; ramuli quadrangulares, lucidi. *Folia* opposita, membranacea, integra, elliptica, ellipticolanceolata vel ovata, apice caudato-acuminata, basi rotundata vel cuneata, utrinque glabra, subtus etiam pallida, 7·5–18 cm. longa, 2·5–7·5 cm. lata, nervi paria 5–7, par infimum ex basi oblique ascendens, alia magis patentia, omnia in nervulum intra marginalem sinuatum congruentia, nervulis transversis paucis et reticulatione haud manifesta ; petioli gracili, 2–5 cm. longi, lineis decurrentibus alati. *Panicula* terminalis, pauciflora, cum pedunculo vix ad 15 cm. longa et 7·5 cm. lata ; rami divaricati ; bracteae foliosae, lanceolatae, acuminatae, caducae ; bracteolae lineares ; pedicelli graciles, 6 mm. longi ; alabastra longissima, apice clavata. *Flores* albi vel pallide lutei. *Calyx* erectus, profunde fissus ; lobi glabri, lanceolati, caudati, 12–18 mm. longi, saepe glandulis paucis peltatis muniti : calyx fructifer auctus, ruber, 3–4 cm. longus, drupam amplectens. *Corollae tubus* cylindricus, apice paullo infundibularis, 7–9 cm. longus, gracillimus ; lobi obovati, obtusi. 12–13 mm. longi, subaequales. *Stamina* longe exserta, antherarum loculis parallelis. *Ovarium* glabrum, obtusum, 4-lobatum ; stylo longissimo gracilis, stigmatis ramis brevissimis. *Drupa* purpureo-nigra, levis, globosa, carnosa, 12–13 mm. diametro, pyrenis 4–1 pyriformibus striatis. *Semina* drupa conformia, testa membranacea, cotyledonibus crassis carnosis,

Malay Peninsula. Perak ; in dense forest near Larut up to 100 m., *King's Collector*, 2944, 3988. Selangor ; at Batu Tiga, *Ridley*, 11,862.

474. **Vitex peralata**, *King* [Verbenaceae] ; species *V. pteropodae*, Miq., proxima sed foliolis latioribus ellipticis vel elliptico-oblongis, nec scabroso-punctatis, differt.

Arbor patula, ad 24 m. alta et 60 cm. trunci diametro ; ramuli crassissimi, angulares, striati. *Folia* coriacea, integra, 5–7-foliolata ; foliolorum par infimum aliis multo minus ; foliola elliptica vel elliptico-obovata, apice acuta, basi longe attenuata, utrinque glabra, marginibus recurva ; foliolum terminale majus, 15–25 cm. longum, 7·5–15 cm. latum, cetera gradatim minora ; nervi utrinque 10–14, subtus prominentes, marginem versus curvati, reticulatione conspicue connexi ; petioli 7·5–15 cm. longi, utrinque latissime alati, alis ad 5 cm. latis sicut folia nervosis ; petioluli nulli vel vix 6 mm. longi. *Paniculae* terminales vel aliquanto axillares, ad 60 cm. longae et 30 cm. diametro ; rhachis angularis, sulcata ; pedunculi primarii crassissimi, ad 20 cm. longi, paullo complanati, secundarii ramis 4 verticillati ; cymulae breves, oppositae vel alternae, multiflorae, ad 13 cm. longae ; bracteae lineari-lanceolatae, persistentes, 2·5–5 mm. longae ; pedicelli nulli vel brevissimi. *Flores* pallide caerulei, brunneo-striati. *Calyx* roseus, brevissime urceolatus, fulvo-pubescens, 2·5–3·5 mm. longus, lobis brevibus acutis, fructifer paullo auctus et recurvus. *Corollae* tubus campanulatus, 6 mm. longus, extra pubescens, intus villosus ; labium superum bilobatum, lobis ovatis acutis 2·5 mm. longis reflexis ; inferum trilobatum, lobis puberulis palato longiore lato obtuso, lateralibus oblongis reflexis. *Stamina* exserta ; filamenta basi complanata, villosa ; antherarum loculis brevibus ellipsoideis. *Ovarium* rotundatum, depressum, supra villosum, infra glabrum, stylo gracili, stigmate bilobo. *Drupa* ovoideo-conoidea, laevis, sulcata, 3–4 cm. longa, 2–3 cm. lata, pericarpio crasso, pyreno conico. *Semen* unicum, testa membranacea, cotyledonibus planis orbicularibus. *King* MSS. in Herb. Calc.

Malay Peninsula. Perak ; at Simpang, *Wray*, 2029, 2254, 2305 ; in dense jungle on low wet ground near Larút, *King's Collector*, 2064, 6187, 6874, 8299.

475. **Vitex longisepala**, *King et Gamble* [Verbenaceae] ; species calycis lobis et bracteis conspicuis insignis, ad *V. vestitam*, Wall. accedit sed foliis majoribus et calyce et bracteis differt.

Arbor parva vel mediocris, ramulis crassiusculis obscure quadrangularibus, molliter fulvis sicut etiam inflorescentia et innovationes. *Folia* membranacea, integra, trifoliolata ; foliolum terminale majus, basi cuneatum, petiolulatum, lateralibus basi inaequalibus subsessilibus, omnia ovata vel elliptico-ovata, apice abrupte caudato-acuminata, supra sparse hispida et glanduloso-punctata, infra fulvo-pubescentia, ad nervos villosa et glandulosa, 10–30 cm. longa, 5–15 cm. lata ; nervi utrinque 8–15, infra prominentes, marginem versus curvati et nervulis transversis multis connexi ; petioli 5–15 cm. longi, dense fulvo-pubescentes. *Cymae* oppositae, axillares, 2–5–6 cm. longae, pedunculis vulgo 2 verticalibus 2–4 cm. longis ramis dichotomis patentibus corymbosis ; bracteae conspicuae, anguste

lanceolatae, 6–20 mm. longae, persistentes ; pedicelli 2–3 mm. longi. *Flores* flavi primulini. *Calyx* villosus, campanulatus, tubus 2·5 mm. longus ; lobi 5 subaequales, oblongo-lanceolati, 6–6·5 mm. longi, conspicui. *Corollae* tubus gracilis, infundibularis, 10–13 mm. longus, extra glandulis luteis instructus ; intus ad staminum insertionem villosus ; labium superum breviter bilobum, lobis rotundis ; inferum 3-lobum, palato obovato lobis lateralibus duplo longiore. *Stamina* exserta, filamentis gracilibus glabris, antherarum loculis elongatis. *Ovarium* conoideum, dense flavo-glandulosum, stylo gracili, stigmate bifido. *Drupa* ovoidea, rugosa, laevis, glanduloso-punctata, 7–8 mm. longa ; pyrena dura, reticulata, sulcata, infra cava, supra loculis 4 fertilibus. *Semina* obovoidea, paullo complanata, 2 mm. longa.

Malay Peninsula. Penang ; at Batu Kawan, *Curtis*, 275. Perak ; at Bujong Malacca, *Ridley*, 9723 ; at Tapa, *Wray*, 1319 ; at Waterloo, *Curtis* ; in open jungle, Goping, *King's Collector*, 460 ; *Scortechini*, 100, 113, 340. Selangor, *Ridley*, 7595 ; at Rawang, *Goodenough*, 10488.

476. **Petraeovitex Scortechinii**, *King et Gamble* [Verbenaceae] ; species distincta, a *P. Riedelii*, Oliv., foliis 3-foliolatis, nec pinnatis, differt.

Frutex fortasse scandens, ramulis fulvis angulosis puberulis. *Folia* opposita, membranacea, trifoliolata, petiolo 4–5 cm. longo ; foliolum medium ovatum, apice breviter et obtuse acutum, basi rotundatum vel cuneatum, 5–8 cm. longum, 2·5–5 cm. latum, utrinque pubescens, marginibus integris vel undulatis, nervis utrinque 4, petiolulo 12–19 mm. longo ; foliola lateralia similia sed minora, basi cordata, paullo inaequalia, petiolulis 6 mm. longis. *Cymae* in paniculas axillares 2- vel 3-chotomas fulvas ad 15 cm. longas dispositae ; bracteae foliosae, orbiculares, 13–19 mm. longae, pallidae ; pedicelli breves. *Calyx* profunde fissus, fulvo-pubescens, lobis 5 vel 4 oblongis vel spathulatis 6 mm. longis ; fructifer valde accrescens ; tubus 6 mm. longus, fructum includens ; lobi 19–25 mm. longi, scariosi, elliptico - oblongi, 3–5 - nervi, reticulati. *Corolla* alabastro brevissima, lobis spathulatis. *Stamina* 4, exserta, 2 posteriora longiora, filamentis brevibus ; antherarum posticarum loculis parallelis, anteriorum divaricatis. *Ovarium* cylindricum, villosum, apice obtusum, loculis 2, stylo brevi et stigmate lobis 2 patentibus. *Fructus* capsularis, oblongus vel cuneatus, ad 6 mm. longus, exocarpio chartaceo striato. *Semina* 2–1, ad placentam centralem affixa ; testa membranacea ; cotyledones obovatae, carnosae 3–4 mm. longae, radicula crassa.

Malay Peninsula. Perak, *Scortechini*, 753 (vel 1753 ?).

477. **Petraeovitex bambusetorum** *King et Gamble* [Verbenaceae] ; a *P. Scortechinii*, King & Gamble, foliis saepe 1-foliolatis glabratis et capsula non striata differt.

Frutex scandens, ramulis fulvis teretibus. *Folia* opposita, chartacea, 1- vel 3-foliolata, glabra, integra, petiolis 2·5–5 cm. longis ; foliola ovata, reticulata, apice acuminata, basi rotundata vel paullo cuneata, 7–10 cm. longa, 4–6 cm. lata ; nervi utrinque 8, curvati,

in nervulum intramarginalem desinentes ; petioluli 6–12 mm. longi, mediano longiore. *Cymae* in paniculas axillares thyrsoideas glabratas ad 12 cm. longas et 7·5 cm. latas dispositae ; rhachis angularis, gracillima ; bracteae foliosae, lanceolatae, longe acuminatae ; bracteolae minutae, setaceae ; pedicelli breves. *Calyx* in alabastro vix 1 mm. longus, lobis acutis triangularibus ; fructifer magnopere auctus, tubo conspicue striato 6–9 mm. longo, lobis oblongo-spathulatis membranaceis trinervis reticulatis 10–13 mm. longis. *Corolla* parva, bilabiata ; labium superum breviter bilobum, inferum profunde trilobum, lobis omnibus minimis glabris. *Stamina* 4, subaequalia, filamentis crassis, antherarum loculis oblongis parallelis. *Ovarium* rotundatum, stylo brevi, stigmate bilobo. *Fructus* capsularis, cuneatus, 7–8 mm. longus, exocarpio tenui pubescenti non striato. *Semina* 2–1, ad placentam centralem affixa, testa membranacea ; cotyledones obovatae, truncatae, paullo emarginatae, carnosae, radicula crassa.

Malay Peninsula and Islands. Perak ; in dense bamboo forest at 160–200 m. near Ulu Kerling, *King's Collector* 8765. Borneo ; *Haviland*, 1913 ; *Ridley* 9065.

478. **Congea Forbesii**, *King et Gamble* [Verbenaceae] ; *C. vestitae*, Griff., et *C. tomentosae*, Roxb., affinis sed ab utraque specie inflorescentia et foliis distincta et praecipue bracteolis 2 intra bracteas involucrales insignis.

Frutex magnus supra arbores alte scandens, ramulis gracilibus cano-pubescentibus. *Folia* chartacea, oblonga vel oblongo-lanceolata, apice breviter acuminata, basi rotundata vel cordata, supra praeter nervos glabra, lucida, infra molliter pubescentia, ferruginea, 7–13 cm. longa, 2·5–4 cm. lata ; nervi utrinque 5–6, marginem versus curvati, nervulis pluribus transversis reticulatis conspicuis ; petioli 5 mm. longi, fulvo-pubescentes. *Paniculae* terminales, fulvo-pubescentes, racemosae, ad 30 cm. longae et 15 cm. latae ; ramuli plerumque 2, pedunculis gracilibus 2·5–4 cm. longis ; capitulae geminatae, 2–5 cm. distantes ; bracteae foliosae, coloratae ; bracteae involucrales 4, cano-tomentosae, oblongo-spathulatae, 2·5–4 cm. longae ; bracteolae 2, linearisetaceae, 7–8 mm. longae. *Flores* pallide purpurei. *Calyx* tubuloso-infundibularis, utrinque, praecipue intus, dense villosus, 7–8 mm. longus ; lobi triangulares, acuti, 2 mm. longi. *Corollae* tubus cylindricus, gracilis, 7–8 mm. longus, extus glaber, intus ad faucem annulatus, villosus ; limbus bilabiatus, labio supero lobis 2, infero lobis 3, lobis omnibus margine crenulatis. *Ovarium* obovoideum, apice parce glanduloso-punctatum, stylo gracillimo. *Drupa* obovoidea, sicca, exocarpio laevi crustaceo. *Semen* unicum ; testa tenuissima ; cotyledones inaequales, carnosae, apice depressae, radicula minima.

Malay Islands. Sumatra ; in deep forest in Lampongs, *Forbes*, 1567.

479. **Acrymia**, *Prain* [Labiatae-Ajugoideae] ; genus novum ovario et fructu omnino *Ajugoidearum*, florum configuratione *Ajugae* Linn., sed eorum magnitudine dispositioneque *Cymariae*, Benth., accedens ; habitu *Gomphostemmatis*, Wall., *Prasiearum*.

Calyx campanulatus, sub-10-nervis, aequaliter 5-dentatus, fructifer parum urceolato-globosus, fauce intus nuda. *Corollae* tubus breviter exsertus, ad faucem parum ampliatus; limbus 2-labiatus, labio postico suberecto 2-fido distincto, antico patente lobis lateralibus posticis subaequalibus, intermedio latiore integro. *Stamina* 4, didynama, anticis longioribus distincte exsertis; antherae 1-loculares. *Discus* parvus, aequalis. *Ovarium* ad medium 4-lobum; stylus apice 2-fidus, lobo postico perbrevi. *Nuculae* obovoideae, reticulato-rugosae, areola laterali fere ad medium extensa affixae.—*Suffrutex* nanus, foliis majusculis. Verticillastri laxi, cymis pedunculatis floribundis, omnes axillares. Flores parvi, numerosi.

Acrymia ajugiflora, *Prain*; species unica.

Suffrutex nanus. *Caulis* basi lignosus, ibique prostratus, radicans, 5–8 cm. longus, 5 mm. crassus, parce fulvo-tomentosus, apice internodiis brevibus vel brevissimis densius foliosus. *Folia* opposita, petiolata, elliptica, apice obtusa, basi cuneata, nonnunquam inaequaliter, vel raro sub-truncata, margine basi integra excepta crenata, supra intense subtus pallidiore viridia, utrinque praesertim secus nervos 5–7-jugos et venas reticulatas fulvo-strigosa; lamina 12–20 cm. longa, 5–8·5 cm. lata; petioli 2–5 cm. longi, dense fulvo-strigosi. *Flores* parvi, cymosi, cymis axillaribus; pedunculi strigosi, graciles, 4–5 cm. longi, dichotome ramosi; pedicelli gracillimi, strigosi, 2–3 mm. longi, bracteolis subulatis longiores. *Calyx* campanulatus, 5-dentatus, 2·5 mm. longus, fructifer urceolato-globosus, 3·5 mm. longus, nervis strigosis. *Corolla* alba, 8 mm. longa, tubo sursum ampliato 4·5 mm. longo; labium posticum 2-lobum, 2·5 mm. longum, lobis oblongis obtusis; anticum 3-lobum, 5 mm. longum, patens, lobis lateralibus posticis similibus iisque vix minoribus, intermedio obovato integro 4 mm. longo 3·5 mm. lato. *Stamina* 4, didynama anticis longioribus, exserta; filamenta ima basi hirsuta, ceterum glabra; antherae 1-loculares. *Nuculae* obovoideae, 1 mm. longae, reticulato-rugosae, praesertim versus apicem parce hirsutae, demum glabrescentes.

MALAYA. Perak; in chalky hills, 150–250 m., flowering in August, *Kunstler*, 10709.

The plant on which this genus is based is closely allied to *Cymaria*, Benth., the hitherto known species of which also seem to be restricted to limestone rocks. While, however, *Acrymia* agrees with *Cymaria* as regards its peculiar inflorescence and repeats the characters of calyx and fruit met with in that genus, it differs from *Cymaria* in having a 2-lobed upper lip which does not conceal the anthers. In *Cymaria* the upper lip is oblong, entire and vaulted over the stamens whose anthers are distinctly 2-celled. Except in being much smaller the corolla of *Acrymia* resembles rather closely the corolla of *Ajuga*, a genus in which the anther-cells, though usually discrete, are sometimes ultimately confluent. In *Acrymia*, however, the anthers appear to be 1-celled from a very early stage. The habit of *Acrymia* recalls that met with in the group of species belonging to the genus *Gomphostemma*, which includes *G. ovatum*, Wall., and *G. Mastersii*, Benth., and is unlike that met with either in *Cymaria* or in *Ajuga*.

480. Pogostemon (Paniculata) nepetoides, *Stapf* [Labiatae-Satureineae]; species *P. plectranthoidi* quam maxime affinis, bracteis tamen minoribus foliisque margine crenatis satis differt.

Suffrutex erectus, ramosus ·75–1 m. altus. *Caules* ramique robustiores, obscure 4-goni, appresse fulvo-pubescentes. *Folia* ramisque opposita, decussata, herbacea, late ovata, obtusa vel subacuta, basi truncata vel rotundata vel breve lateque cuneata, margine basi integro excepto duplicato-crenata, supra praesertim secus nervos sparse appresse pubescentia, subtus praesertim secus nervos densius appresse fulvo-pubescentia, 4–7 cm. longa, 3·5–5·5 cm. lata; petioli 1–2·5 cm. longi, dense appresseque fulvo-pubescentes. *Verticillastri* in spicis simplicibus continuis ovato-cylindricis pedunculatis 2 cm. longis 1·25 cm. latis aggregati, pedunculis pubescentibus ·5–1 cm longis; spicae dense ad apices ramorum paniculatae; bracteae latae, ovatae, striatae, acutae, apice coloratae, inferiores 8 mm. longae, floribus vix aequilongae, ceterae sursum gradatim breviores. *Calyx* anguste campanulatus, 5·5 mm. longus, extra pubescens, lobis 5 lato-lanceolatis acutis aequalibus tubo duplo brevioribus. *Corolla* pallide purpurea, 8 mm. longa, extus parce pubescens, lobis subaequalibus. *Filamenta* subadscendentia, barbata. *Styli* rami subaequales, 3 mm. longi. *Nuculae* ovoideae, glabrae.

PHILIPPINES. Without precise locality, *Micholitz*.

XVIII.—THE LOCALITIES OF CUMING'S PHILIPPINE PLANTS.

R. A. ROLFE.

An unfortunate confusion exists in Herbaria as to the localities of the plants collected by the late Hugh Cuming in the Philippines and other places visited during the same voyage, which has led to various plants being wrongly credited to the Philippines, and in at least one case has resulted in the imposition of an erroneous specific name.* Some of these errors have already been pointed out,† but others are still being cited in Monographs,‡ and as some additional information has been discovered in the correspondence of the late Sir William Hooker it seems desirable to outline the history of the collection.

During the dispersal of his earlier Natural History Collections, made in South America and the Pacific Islands, Cuming had had much correspondence with Dr. (later Sir) William Hooker, then

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* *Henslovia philippinensis*, A. DC., based on Cuming, n. 2255, is a native of Malacca.

† Rolfe in Journ. Linn. Soc. xxi. p. 287; Vidal Phanerogamae Cumingianae Philippinarum, pp. 85–88.

‡ *Eriocaulon truncatum*, Ham., is given as Philippine on the strength of Cuming, n. 2326 (Ruhl. in Engl. Pflanzenreich, Eriocaul. p. 107), but the specimen was collected in Malacca. Miss Perkins also cites Cuming 2330 (*Mangifera lagenifera* Griff.) as Philippine (Fragm. Fl. Philipp. p. 25), but it also came from Malacca.

at Glasgow, and in a letter from 79, Charlotte Street, Fitzroy Square, London, dated November 24, 1834, Cuming remarked :— "I shall feel most obliged if you will gain any information in Glasgow or Greenock respecting Manilla and the Philippine Islands, as it respects the climate, state of society amongst the lower classes and the aborigines, or any information of the Civil Government towards strangers, particularly those who might visit this place on Scientific pursuits. At the same time please to let me know if there have been any collectors of Natural History in those Islands, or Botanists. I am still of a roving mind, and should I gain anything like a satisfactory account of the place I have a great mind to pay it a visit for two or three years."

On July 6, 1835, he again wrote, announcing that he had received the permission of the Spanish Court from the Spanish Ambassador, through the influence of the Earl of Derby, to visit the Philippine Islands. He also announced his intention to start early in the New Year, and to collect the most complete Flora that circumstances permitted, including fruits and woods, and at the same time requested hints and instructions as to collecting, and letters of introduction to persons who might have interests in the Straits of Malacca, Singapore, Penang, Canton, Java and Manilla, which places he hoped to visit. Various other letters followed, showing that Dr. Hooker heartily assisted the project. Finally on December 18, 1835, Cuming announced his intention to sail from Liverpool on or about the 15th of January following.

On December 24, 1836, Cuming announced that he had arrived at Manilla on July 24th, but as the rainy season had just set in he could not make excursions into the country until the end of September. He then left for the Hacienda of Calaguan (Calauan), in the Centre of Luzon (Province of Laguna), where he remained till the 15th of December, making excursions in the neighbourhood, the result being that he had already collected about 1,150 species of all classes, of which about a tenth were ferns. He had also about 60 Orchids (not many in flower) and 125 Fungi. He was then preparing for a journey to the southern islands, Cebu, Negros, Leyte and Mindanao, where he expected to give an equally good account of himself.

On November 18, 1838, he again wrote, alluding to a letter sent a year previously, to which no reply had been received, so that it probably failed to reach its destination. He now reported as to his further journeys. After leaving Calaguan (Calauan) he went to the islands of Panay, Guimaras, Negros, Siquijor, Cebu, Bohol, Camiguin and Mindanao, which occupied ten months, and at the close the plants amounted to 1,900, including many ferns. His last trip was a continuation of the journey to the southern islands, namely, Samar, Leyte, Mashate, Ticao, Burias, Mindoro, and the south-eastern provinces of Luzon, Albay, Camarines, Tayabas and Batangas. His fern collection was now augmented to 400 species, and the plants to 3,000. He had ascended to the very tops of some of the mountains, to 5,000, 6,000 and even 7,000 feet. On the sea coast the plants were the same in all localities, but the dark woods and deep glens were his delight. He was now preparing for a journey to the north part of the island, and he expected to return in July following. In October he would start for Singapore,

which he would leave in March, 1840, en route for England. He had received much assistance and protection from the Government and the authorities, and the friars were his best friends. But he had suffered much from ill health and fatigue, and his eyes had been injured by being in the sun too much—in short he was ten years older than he ought to have been. He had had the misfortune to have a large case of plants stolen from the warehouse in which it was deposited. How he should succeed in the north he could not say, as there was war between the Negroes and the White people, but he could not leave such a place untouched.

On June 5th, 1840, writing from 8, King's Road, Gray's Inn, London, he announced his safe arrival that morning from Singapore, with all his collections. Since his last letter he had been at Mt. Ophir, in the Malay Peninsula, and collected, as promised, a splendid fern, with many others, at 4,600 feet elevation. He hoped to have his collections in order by the end of August, and if convenient for Dr. Hooker to be in London he hoped to meet him, "more particularly so," he added, "as it is my wish for you to have the first choice in all the plants, as before." He also added :—"I will exert myself to get all the plants in order; those families that I am acquainted with I will put together, such as the Ferns, Orchideae, Malvaceae, with their localities, time collected, &c."

On October 13th he wrote, from 80, Gower Street, Bedford Square :—"I have the pleasure to inform you that my labours in unpacking are nearly finished, as I have but one case to put in order, which I expect to be done by the end of the week."

From a letter dated May 25th, 1841 (after Sir William Hooker had moved to Kew), it appears that the plants were distributed by April 15th (the number being 2,571), and were waiting to be dispatched; also that Mr. Bennett had been present most of the time while the distribution was being made. On November 26th (evidently in response to an application for the localities) he again wrote that Mr. Bennett, "of the Museum," kept a correct record of all the localities, of which he could not get a copy until his return from holiday, but that when the plants were selected the localities were put on the numbered distribution ticket which began a new locality, and this was done to every set. The promised copy was sent on March 9th following, but is unfortunately incomplete, not accounting for the ferns, and specially excluding a lot of things described as "miscellaneous from the Philippines, consisting of the Fungi, Mosses, Lichens, Figs, Lycopodiums, &c., &c." There was apparently another complaint, for on February 22 (the year is omitted) he wrote :—"I am now going over my plants, and hope in a few days to send you the missing localities that you are deficient of. That, with the list I have received from Mr. Bennett, I hope will prove to your satisfaction." Whether the promised information was ever received is uncertain, as no trace of it can be found. Whether Mr. Bennett's original list is still in existence is also doubtful, as no trace of it can be found at the British Musuem. But it probably contains the same imperfections as Sir William Hooker's copy.

The copy in question was evidently utilised in the preparation of an old list of determinations from which the localities given in Vidal's Phanerogamae Cumingianae Philippinarum was largely extracted, but the inclusion of numbers cited from other sources has introduced a number of contradictions, so that great uncertainty exists as to many of the localities.

From the preceding it is clear that Cuming used no field numbers, and that the distribution numbers were not added until after the ferns and other Cryptogams, Orchids, Figs and some others had been separated. These numbers were given as the bundles were successively distributed, and only partially indicate the sequence in which the places were visited. With the information now published it might be possible to eliminate some of the errors by a re-examination of the original tickets, but it is doubtful whether the material for a complete itinerary is in existence. The correspondence shows that some such journal was prepared by Cuming and submitted to Sir William Hooker with a view to publication, but was returned as unsuitable. Its subsequent history cannot be traced.

An attempt has been made, in the light of the above correspondence, and with the aid of Sir William Hooker's original list of determinations, to trace the localities of the extra-Philippine numbers but only with partial success. Among the flowering plants the earliest numbers for Sumatra, Malacca, Singapore and St. Helena have been found, and all are carefully localised by Cuming himself, as described above. This shows that numbers 2252 to 2399 are from Malacca, 2400 to 2427 from Singapore, 2428 to 2443 from Sumatra,* and 2444 to 2464 from St. Helena. Besides these errors there are certain others, arising from the fact already mentioned that certain groups had been separated before the numbers were added. Very few indications of what these are can be found in Sir William Hooker's list. But there are the following respecting the Vascular Cryptogams :—363 to 368, Singapore ; 369 to 407, Malacca ; 420 to 429, St. Helena. No indications of Sumatran ferns can be found, either here or in Smith's Enumeratio Filicum Philippinarum, which also included Cuming's extra-Philippine numbers. These numbers require confirmation, because 369 and 420 are not localised by Cuming on the ticket, while 363 has not been found. The list also indicates 2443 to 2251 as Sumatran Algae, and 2443 is carefully localised on the ticket by Cuming himself. A few other numbers are localised in pencil, and in a tentative way, on the list, but as the corresponding determinations are not entered it is impossible to verify them, and the only practicable course would be to compile a new list from the original tickets as the missing specimens come to hand.

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* The numbers from Sumatra and St. Helena were not correctly indicated in Vidal's Phanerogamae Cumingianae Philippinarum.

XIX.—ADDITIONS TO THE WILD FAUNA AND FLORA OF THE ROYAL BOTANIC GARDENS, KEW: VII.

I. FAUNA.

COLEOPTERA.

H. St. J. Donisthorpe.

The following species of Coleoptera taken in Kew Gardens are mostly new to the published list of the Wild Fauna and Flora of the Royal Botanic Gardens, Kew. The number of species recorded up to now is very small, and there is no doubt that more close and systematic working will produce many more. Specimens taken by Mr. G. Nicholson are marked "G. N." and those taken by myself "H. J. D."

ADEPHAGA.

Amara continna, *Th.*, flying in grounds (11, v., 95). H. J. D.

Amara similata, *Gyll.*, in Propagating Pits (21, xii., 07). G. N.

Pristonychus terricola, *Hbst.*, under stone. Queen's Cottage Grounds (21, xii., 07). G. N.

HYDROPHILIDAE.

Cercyon flavipes, *F.*, on window in Propagating Pits (3, xii., 07). H. J. D.

Cercyon unifunctatus, *L.*, on window in Propagating Pits (3, xii., 07). H. J. D.

Cercyon quisquilius, *L.*, on window in Propagating Pits (3, xii., 07). H. J. D.

Cercyon nigriceps, *Marsh.*, on window in Propagating Pits (3, xii., 07). H. J. D.

STAPHYLINIDAE.

Homalota occulta, *Er.*, on window in Palm House (23, iii., 96), H. J. D.

Cilea silphoides *L.*, on window in Propagating Pits (3, xii., 07). H. J. D.

Ocypus morio, *Gr.*, under stone in Fern House (28, i., 08). H. J. D.

Philonthus laminatus, *Crentz.* (12, iv., 06). G. N.

Philonthus varians, *Pk.*, Propagating Pits (3, xii., 07). H. J. D.

Homalium rivulare, *Pk.*, on window in Propagating Pits (3, xii., 07). H. J. D.

Clavicornia.

Choleva nigricans, *Spence*. Queen's Cottage Grounds (21, xii., 07). G. N.

Choleva grandicollis, *Er*. Queen's Cottage Grounds (21, xii., 07). G. N.

Lamellicornia.

Oxyomus porcatus, *F*., on window in Palm House (23, iii., 96). H. J. D.

Serricornia.

Ptilodactyla santivincentis, *Champ*, ♂ ♂ and ♀ ♀. Propagating Pits (3, xii., 07); 4, i., 08, &c.) The ♂ ♂ have beautifully flabellated antennae.

Rhragonycha pallida,, *F*. (12, iv., 06). G. N.

Malachins bipustulatus, *L*. (12, iv., 06). G. N.

Necrobia rufipes, *De G*., in parcel of specimens from Uganda (21, i., 08).

Phytophaga.

Plectroscelis concinna, *Marsh* (12, iv., 06). G. N.

Heteromera.

Meloë prascarabaeus *L*. The common "Oil beetle." In grounds (29, iv., 89). H. J. D. The "Oil beetles" in their early stages are parasitic on bees of the genus *Anthophora*.

Rhynchophora.

Phyllobius pyri, *L*. (12, iv., 06). G. N.

Phyllobius maculicornis, *Germ*. (12, iv., 06). G. N.

Phyllobius vividiaeris, *Saich*. (12, iv., 06). G. N.

"Scolytid" sp? Propagating Pits (3 & 4, xii., 07). Five specimens were taken of this small Scolytid beetle which I have been unable to name or get named at the Natural History Museum. H. J. D.

HYMENOPTERA.

Formicidae (Ants).

H. St. J. Donisthorpe.

The following is a list of the ants taken by, or obtained for, me in the hot-houses at Kew since December 3rd last. I am indebted to the kindness of Professor Forel for the names of most of the species. In his last letter he writes "you have a large Fauna in the houses at Kew." They are all my own captures except where it is otherwise stated. Those marked with * are new to the Kew published list (Bulletin, Additional Series V., 1906, p. 27).

Prenolepis longicornis, *Latr.* A cosmopolitan species. ♀ ♀ and ☿ ☿ Propagating Pits, and No. 18. J. H. Dines found a nest in a flower-pot in the Propagating Pits containing 13 ♀ ♀.

***Prenolepis caeciliae**, *Forel.* Species from Costa Rica. Abundant in Fern and Palm Houses.

Prenolepis vividula, *Nyl.* Central American species. Occurs in No. 18 and Palm House (23. III. 96). The late Mr. Haliday took it in hot-houses in Ireland.

***Prenolepis flavipes**, *Smith.* Japanese species. ♂ ♂, ♀ ♀, and ☿ ☿ amongst lily bulbs from Tokio. Jan., W. B. Little.

***Plagiolepis alluardi**, *Em.* Species from Seychelles Isles. Abundant in Palm House. Occurs in the Botanic Gardens in Edinburgh and Dublin.

Technomyrmex albipes, *Smith.* Cosmopolitan species. Abundant in Propagating Pits, Fern and Palm Houses, &c. Winged ♂ ♂, and very interesting ergatoid (wingless) ♂ ♂ not uncommon in Palm House.

***Ponera coarctata**, *Latr.* Winged ♀. Palm House.

***Ponera coarctata**, sub. sp. **boerorum** *Forel.* South African species. ☿ ☿. Fern House.

***Tetramorium simillimum**, *Smith.* Cosmopolitan species. ♀ ♀ and ☿ ☿. Palm House.

***Wasmannia auro-punctata**, *Roger.* West Indian species. Abundant in Propagating Pits and No. 18. ♂ ♂, ♀ ♀ and ☿ ☿; nests in and under flower-pots, and in the leaf-sheaves of *Piper obliquum*, var. *eximium*. It is stated to cultivate fungi.

***Pheidole anastasii**, *Em.* var. **cellarum**, *Forel.* Central American species. ☿ ☿, both the small form, and the large form with very big heads, called "soldiers," in numbers. Orchid House, C. P. Raffill. This new variety is very abundant in the hot-houses at Zurich.

Triglyphothrix striatidens, *Em.* Widespread. ☿ ☿ scarce in Fern House and common in Palm House.

***Strumigenys rogeri**, *Em.* West Indian species. ☿ ☿ scarce in Propagating Pits.

HEMIPTERA-HOMOPTERA.

APHIDAE.

R. Newstead.

The only representative of this family sent to me since the publication of the first paper on the Kew Fauna is an interesting species apparently new to the British Isles, and although it was, in the first instance, thought to be new to science, I have come to the conclusion that it is the insect described by Passerini as *Rhizobius menthae*. Buckton[1] says that he has not been able to identify this and an allied species in England, so that the record is of much interest.

The examples have been forwarded to the British Museum of Natural History so that they may be available for future study.

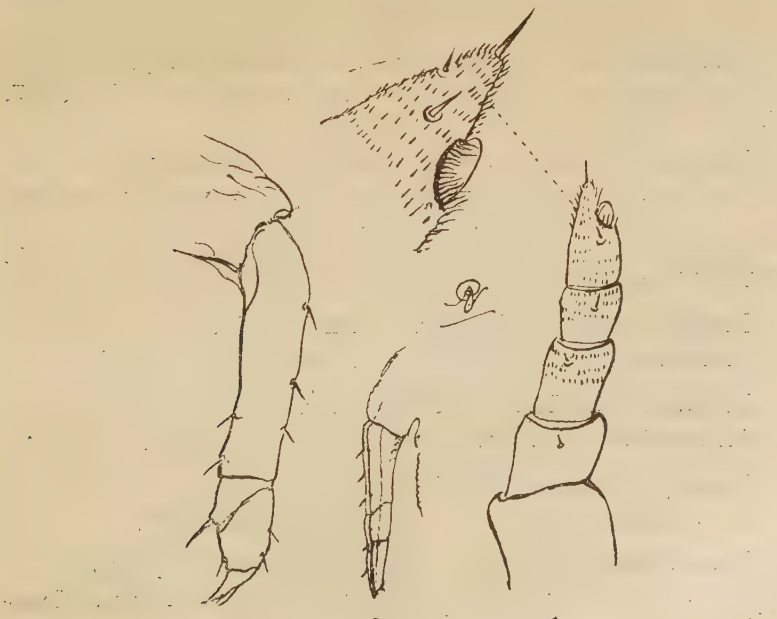
[1] Monograph of British Aphides, vol. iv., p. 93.

I have given a description of the insect, and have also added figures of the antenna, proboscis and anterior tarsus in order to facilitate its identification by those who may be interested in the study of these somewhat obscure insects.

Rhizobius menthae, *Pass.*

Females and developmental stages living in aggregated masses of densely felted or flocculent secretion on the underground stems and roots of the food-plant. The flocculent matter is pure white, but extremely fragile, and is usually formed upon the underground stems and roots, more especially the former, where there are small cavities in the surrounding soil. Isolated sacs sometimes occur, and these are irregularly spheroid in shape.

Apterous adult female dull orange yellow, sometimes with a pale reddish tinge, especially on the dorsum. Legs, antennae and proboscis smoky brown, articulations black. The integument, in life, is covered with a fine thin coating of meal-like secretion, but this does not obscure the colour of the integument. Antenna (Fig. 1) slightly tapering, of five segments ; 1st much the broadest, 3rd, 4th and 5th with irregular rings of minute spines and a few larger spines ; apical segment emarginate, the emargination with a tuberculate process which is partly hidden by a fringe of wavy hairs. Legs (Fig. 2) short stout, sparsely spinose ; first tarsal segment with a longer spine than those on the other segments of the leg. Proboscis (Fig. 3) of four segments, the length equal to that of the anterior leg, but slightly stouter at the base. Compound spinnerets large, compact, much depressed, and arranged in a double irregular series in groups of from 7–11 in number. The derm is also furnished with a few minute spines which are widely separated and irregularly placed.



Rhizobius menthae.

Habitat: On the roots and underground stems of *Mentha aquatica*, The Lake, Kew, 13.10.06. Collected by Mr. G. Nicholson, to whom I am much indebted for a liberal supply of specimens.

The young females and larvae resemble the adults in colour; but the immature females are generally covered with a long white flocculent secretion.

The characters herein described agree, on the whole, with Passerini's description of *Rhizobius menthae*, but I do not find the marked variation in the antennal formula which is said by the author to exist in this insect. It is just possible therefore that the examples from Kew may hereafter prove a distinct species; but we know so little of the structural characters of the British Aphides that I do not deem it desirable to add to the confusion that already exists by erecting a new name for this addition to the fauna of the British Isles.

Coccidae.

R. Newstead.

This second supplementary list of the scale insects includes but a single species (*Pulvinaria vitis*, var. *euonymi*) that is new to the Kew Fauna; but the food-plants of the remaining species are all new. As stated in the previous list these are important from an economic standpoint, and should be placed on record.

Physokermes abietis, *Geoff.* (Females only.)

Two examples were "shaken into an umbrella" from *Calluna vulgaris* (6.6.07); but as this insect is confined to the Spruce fir (*Picea excelsa*) these specimens had in all probability fallen from the branches of an overhanging tree.

Pulvinaria vitis, var. **euonymi**, *Gour.* (Females only.)

On *Euonymus europaeus variegatus* (7.6.06); Coll., W. Dallimore.

Lecanium persicae, var. **ribis**, *Fitch.* (Females only.)

On *Ribes speciosum*, a Californian species growing against a (11.12.07). Coll., W. B. Little.

On *Teucrium radicans* and *Cercis chinensis* (on a wall). Coll., W. B. Little (30.1.08).

Lecanium longulum, *Douglas.* (Females only.)

On *Putranjiva Roxburghii.* Coll., G. Nicholson (28.3.07).

Lecanium oleae, *Bern.* (Females only.)

On *Randia macrantha.* Coll., G. Nicholson (1907).

Pinnaspis buxi, *Bouché.* (Females only.)

On *Vellozia tricophylla.* Coll., G. Nicholson (1907).

Diaspis boisduvallii, *Sign.* (Females and male puparia.)

On *Vellozia tricophylla*, from British Central Africa, House No. 18 (19.9.07). Coll., G. Nicholson.

Aspidiotus zonatus, *Frauen.*

A large colony of male puparia, on the underside of the leaves of *Quercus pedunculata.*

These examples formed the prettiest little colonies that I have yet seen in this country, and they were unusually numerous, though the females were very scarce.

Dactylopius citri, *Risso.* (Living adult females and empty male puparia.)

On *Myrtus communis,* var. *tarentina.* Coll., W. B. Little, (30.1.08). The host plant was growing against a wall, some distance from a glass house. This record is therefore of great interest as showing the hardy nature of this insect. It is, I believe, the common practice among horticulturists of this country to expose bug-infested houses to the action of frost with the view of ridding such structures of meally bug. In the light of this discovery it is quite evident that such measures must be altogether futile.

II. FLORA.

PHANEROGAMS AND VASCULAR CRYPTOGAMS.

A. B. Jackson.

Trifolium pratense, var. **americanum,** *Harz.* Rough grassy and shady places in the Arboretum and elsewhere. It differs chiefly from the common form of the Red Clover in being much more robust in habit, a foot high or more, and having the stems clothed with spreading not appressed pubescence. No doubt of American origin and only found here in a naturalised condition. Harz points out (Bot. Centralb. 45, 106) that large quantities of the seed of this American form are sown in Germany, and I am informed by Messrs. Sutton that it is cultivated to some extent in this country. They state however that, while in special cases it may prove very luxuriant, yet its height and vigour differ with soil and climate, and they have not found it to be any more productive than other strains. It seems, too, to be affected by variations of temperature and on account of this susceptibility is not strongly recommended as a fodder plant.

Scirpus maritimus, *L.* This species, which has been inadvertently omitted from the Kew list, occurs within our area on mud banks by the river associated with *Eleocharis palustris, Scirpus triqueter, S. carinatus* and other moisture-loving plants. It is rare inland but has been known as a Thames plant for over a century, and is still holding its own here. The figure in Curtis Fl. Londinensis is drawn from a Thames specimen. See Trim. & Dyer, Fl. Middlesex, 299 (1869).

Lolium italicum, *A. Br.*, var. **muticum,** *DC.* Rough unmown places about the Arboretum, especially near the Palace. This awnless variety of the Italian Rye-grass grows here with the type,

and is liable to be passed over for *L. perenne*. It may be distinguished by the scabrid rachis, but is connected with the type by an intermediate state, which has some of the flowering glumes shortly awned. A very variable species; when growing under luxuriant conditions, as it does at Kew, the spikes often become branched.

L. perenne × italicum. A grass which Dr. K. Domin thought was this combination was not uncommon at Kew last August wherever the parents occurred.

Selaginella krausiana, *A. Br.* Occurs in a naturalised condition in the Rhododendron dell and in the Rockery. Is not uncommon naturalised in warm parts of Devon and Cornwall. A native of Cape Colony, Fernando Po, Azores, &c.

MUSCINEAE.

Decranoweisia cirrata, *Lindb.* This common species had not been known to fruit in the gardens until Mr. Nicholson found it in small quantity on the branches of an elder in Queen's Cottage Grounds. In a barren state it has been found in the Arboretum on trunks of oak and elm. This is a frequent species in the Midlands, sometimes covering thatched roofs with its green cushions which bristle with capsules. It is however somewhat erratic in its distribution, and is still unrecorded from Cambridge, Hunts and West Norfolk. It is very rare or extinct in Oxfordshire.

Barbula tophacea, *Mitt.* On blocks of Oolite by the small pond in the Himalayan House or North wing of the Temperate House. Mr. Nicholson tells me the stone was brought from Moreton-in-Marsh, Gloucestershire.

Weisia tenuis, *C. Mueller.* Same habitat as the last and doubtless introduced at the same time.

Splachnobryum Wrightii, *C. Mueller.* In August last Mr. Nicholson found in one of the forcing houses a moss which had somewhat the habit of a *Fissidens*, in good fruit on woody stems of *Vellozia trichophylla*—a tropical African Monocotyledon, sent from British Central Africa by Mr. J. McClounie. Microscopic examination showed that this moss belonged to the genus *Splachnobryum*, which consists entirely of tropical and sub-tropical mosses. Mr. H. N. Dixon, who recently (Journ. Bot., 1907, p. 81) described another species, *S. delicatulum*, found as an alien on brickwork in an orchid house at Baldersby Park, Yorks, on seeing a specimen of the Kew novelty, suggested that it might belong to *S. Wrightii*, C. Mueller, Verhandl. Zool. Bot. Ges. Wien., 1869, p. 501, a West Indian species, which was also detected in the Royal Botanic Gardens, Glasnevin, Dublin, where it was no doubt introduced with stove plants. This was described and figured by Braithwaite (Journ. Bot., 1872, 193). The Kew plant agrees well with drawings of the leaves and areolation of *S. Wrightii*, which Mr. W. R. Sherrin was good enough to make for me from British Museum material, collected by Wright in Cuba. Dr. Brotherus, however, to whom I also sent a specimen, considers it an undescribed moss, pointing out in addition that the habitat was

unique—no species of *Splachnobryum* being known to occur on plant stems. Mr. Dixon after seeing a second specimen and the drawings writes :—

I certainly cannot see anything to separate the *Splachnobryum* from *S. Wrightii*, C. Mueller, judging from the drawings ; and I cannot help thinking it would be a mistake to describe it as new, from the material available unless there were some decidedly marked character to base it upon. It is I suppose possible that it may not be on its original host at present ; the Baldersby plant (see Journ. Bot., 1907, 81) died away each year and re-appeared, presumably from the spores, and if this were the case with the Kew plant it might conceivably have come over with a western plant originally." Dr. Brotherus in a further communication states that he is unable to say whether or not the plant is identical with *S. Wrightii*, as he has not had an opportunity of comparing it with that species.

Eurhynchium piliferum, *Bruch. et Schimp.* On clay in the Rhododendron dell ; a new locality. Previously only known from the Palace Grounds.

XX.—MISCELLANEOUS NOTES.

Sir Richard Strachey, R.E., G.C.S.I., F.R.S.—By the death at his residence in London on February 12, 1908, of this distinguished Anglo-Indian official and statesman, in his 91st year, Kew has lost a warm and devoted friend.

A grandson of Sir Henry Strachey, Bart., of Sutton Court, Somerset, and third son of the late Edward Strachey, Bengal Civil Service, Sir Richard was born at Sutton Court on July 24, 1817. After two years spent at the military college of the Hon. East India Company, Addiscombe, he was appointed to the Bombay Engineers in 1836, and was transferred to the Bengal Engineers in 1839. With the exception of an interval of active military duty during the first Sikh war, when at the battle of Sobraon his horse was shot under him, and of another interval during the Indian Mutiny, when he served as Secretary in all departments to the Central Provinces Government temporarily constituted to meet the occasion created by the investment of the Lieutenant-Governor of the North-West Provinces in Agra, the whole of Sir Richard's services were devoted to the Department of Public Works, at first in connection with irrigation and later in connection with railways. Of his great and lasting achievements as a civil servant, and of his many and signal services to India and its Government, this is not the place to speak; nor is it necessary here to detail his contributions to, or to describe the results of his active interest in, the subjects of Indian meteorology and Indian geography, as to which he was a recognised authority. A record of his efforts to advance our knowledge of Indian botany may, however, be appropriately given here.

At the close of the Sikh War Strachey, who had made the authoritative plan of the Sikh position and of the attack at Sobraon, and had assisted in the construction of the bridge across

the Sutlej which enabled our troops to enter the territory of the Sikh Khalsa, was given a brevet-majority for his distinguished services, and was permitted to return to the substantive post of Executive Engineer of the Ganges Canal, to which he had been appointed in 1842. Frequent attacks of fever, however, necessitated his transfer to the Hill Station of Naini Tal, and afforded him opportunities, of which he availed himself to the utmost, of studying the vegetation of the North-Western Himalayas, more especially in Kumáon and in the adjacent portions of Garhwál and Tibet.

Little was known regarding the flora of Kumáon until about sixty years ago, when Strachey commenced his scientific survey of the mountain ranges westward of Nepal, and afterwards, in 1848, undertook an extensive journey with Mr. J. E. Winterbottom to the Rakas-tál and Manasarowar Lakes in Tibet. It was on the latter occasion that a large proportion of the plants contained in what is known as the "Strachey and Winterbottom Herbarium" was collected. Starting from the plain of Rohilkhand at an elevation of about a thousand feet above sea-level, a north-easterly route was taken across the snowy ranges, and terminating on the Tibetan plateau at an altitude of between fourteen and fifteen thousand feet on the upper course of the river Sutlej. A detailed account by Sir Richard Strachey of this very interesting journey will be found in the Journal of the Royal Geographical Society of London, Vol. XV. (1900), which is also referred to in a paper by Hemsley on the "Flora of Tibet or High Asia" published in the Journal of the Linnean Society, Vol. XXXV. (1902). The herbarium, which contained over two thousand species (including cryptogams), was distributed in 1852–53 to the Hookerian Herbarium (now at Kew), the British Museum, the Linnean Society, and to some of the Continental museums. All the specimens were carefully labelled with notes of the localities and elevation at which they were found. A provisionally named catalogue, prepared by Sir R. Strachey, was printed, and a copy was sent with each distributed set of plants. This catalogue was afterwards revised, and appeared in 1882 in Atkinson's "Gazetteer of the Himalayan Districts of the North-West Provinces and Oudh" (now known as the United Provinces of Agra and Oudh). At the request of Sir Richard Strachey another revised edition was prepared by Mr. J. F. Duthie, formerly Director of the Botanical Survey of Northern India, and was published in 1906 by Messrs. Lovell Reeve and Co. It contains the whole of the Strachey and Winterbottom collections, with the nomenclature of the species brought up to date in accordance with Sir Joseph Hooker's "Flora of British India." It also includes many additional species discovered subsequently by various collectors.

Of the large number of new species and varieties discovered by Sir R. Strachey, no less than thirty-two bear his name. One of these, *Stracheya tibetica*, representing a distinct and monotypic genus, was found by him in the Gugé Valley, within the borders of Tibet, at an elevation of fifteen thousand feet. But perhaps the most interesting novelty, from a botanical point of view, was a very minute plant called *Circeaster agrestis*, which, owing to the extreme simplicity of its floral structure, has presented much

difficulty in the attempts of botanists to determine its true affinity; and even now it occupies only a provisional and somewhat doubtful position as a member of the natural order *Chloranthaceae*. It was found by Sir R. Strachey in the Rálam Valley at about eight thousand feet above the sea, and has since been collected in Tibet and in North China.

Sion and Pagoda Vistas.—When, in 1845, the Pleasure Grounds of Kew were put under the charge of Sir William Hooker (who had already had charge of the adjoining Botanic Garden since 1841), W. A. Nesfield, a noted landscape gardener of the time, was commissioned to prepare a scheme for the treatment of the newly acquired area, both from a landscape point of view and as a national, scientifically-arranged Arboretum. The most notable and enduring features of Nesfield's scheme were the two noble avenues known as the Sion and Pagoda Vistas.

Although the two great divisions of the "Kew Gardens" of earlier days—the Pleasure Grounds and Botanic Garden—were henceforth under the one management, a light iron fence still divided them, and no attempt beyond the formation of these two vistas (and a shorter one to the west) appears to have been made to blend their landscape treatment. The various plantings on one side of the fence had no bearing or connection with those on the other side.

As a matter of history it may be mentioned that the iron fence just alluded to was erected in 1843. In that year 45 acres had been taken, by permission of Queen Victoria, from the Pleasure Grounds and added to the old Botanic Garden, which at that time covered under 20 acres. The fence marked the new boundary. It began a little to the north of the Unicorn Gate and followed fairly closely the course of the historic "Stafford Walk" until it reached the private grounds of Kew Palace. In that position it remained until April, 1895, when it was removed, and the differentiation of "Kew Gardens" into the Botanic Garden and the Pleasure Grounds no longer obtained.

Since the removal of the fence every opportunity has been taken to blend the two parts of the Gardens, especially by opening up informal vistas and avenues extending from one to the other. These vistas have not only improved the landscape aspect of Kew by giving a sense of greater spaciousness and distance of view, but have also proved useful in providing new routes for visitors, who, previous to 1895, had to find their way from one section of the Gardens to the other by means of one or other of the four gates in the fence. One more step was required to link the two parts of the Garden and to mask the transition from Botanic Gardens to Pleasure Grounds. This, however, involved some modification in the treatment of the two great formal vistas, and, owing to the pressure of other work, it has been necessary till the past winter to allow these to remain unaltered. A gravel walk ran along the centre of each of them from the Palm House to the Stafford Walk. The remainder, extending to the Pagoda in the one case and to the banks of the Thames in the other, has long been smooth lawn.

After the fence was taken away this distinction had no meaning, and the aspect of each vista was impaired by the gravel walk breaking into the long sweep of lawn and abruptly ending. In both cases, too, the avenue of trees stopped at the Stafford Walk. During the past winter the gravel paths have been turfed over as far as the holly hedge that surrounds the formal garden south-west of the Palm House, and the avenues of trees have been extended to the same boundary. Two new gravel walks have been made to replace those turfed over; one leads from the formal garden direct to King William's Temple; the other, also commencing at the formal garden, has been made to join the path which skirts the Azalea Garden and passes through the Beech and Hazel collections to the Bamboo Garden.

W. J. B.

Utilization of Pond Mud.—Several of the old agricultural writers have advocated the utilization of pond mud, and as a writer in "British Husbandry" (1837) observes: "The mud from ponds, when they are cleaned out, has always been an object of attention to farmers." The composition of the sediment may vary considerably, as will be seen from analyses given below, and is naturally dependent on the character of the pond. Where a pond is placed at the lower part of a field it is likely to receive, after rain, surface washings which may be rich in manure. If, however, the pond contains springs, the sediment may be of little or no value.

Pond mud has proved valuable at the Royal Botanic Gardens, Kew, where the deposit from the bottom of the lake has been used for some years past for general gardening purposes, as a dressing for the lawns, and also as a mulch for the beds, borders, and trees. It has also been used for such pot-grown plants as chrysanthemums, dahlias, fuchsias, pelargoniums and other gross feeders. The best examples of *Calanthe* and *Phaius* (orchids) ever grown at Kew were planted in this mud. It is also an excellent soil for vegetables. As an example of how freely it may be used for trees, mention may be made of a mulch, 4 in. thick, which was placed last winter about the large horse-chestnut near the Thames; the effect of this on the health of the tree is already most marked. The only plants for which it has not been found suitable are *Ericaceae* and peat-loving plants generally. Probably this is due to the presence of calcium carbonate in the Thames water, from which the Kew lake is fed, and also to the shells of various molluscs which are abundant in the lake. The only harm that might possibly result from the use of this mud would arise if it were allowed to lie as a cake, so that air was excluded from the roots. The mud at Kew is the silt from the Thames water and contains decomposed vegetable matter from the surrounding trees, &c.; when first taken out it has almost the consistency of clay, and in this condition is unsuitable for use. The practice at Kew is to drain off the water from the lake, and when the mud can be cut out with spades it is carried in barrows on to the banks where it is allowed to lie and drain until it can be broken up easily. It is then distributed over the lawns, woods, beds, &c.,

where under the influence of weather it soon breaks down. If used on beds or borders it is forked over, and mixed with the other soil soon after it has been put on. For lawns it is used in the proportion of about 20 loads to the acre, it is then chain harrowed and raked, and after that it soon works down below the grass. When the lake was first cleaned out in 1892 to 1894 the mud was found to be five feet deep in some parts, and altogether some thousands of loads were removed.

An analysis has been made of the mud taken from the Kew lake, and also of some pond mud from Nottinghamshire. The sample from Kew contained 45·15 per cent. of moisture and that from Nottinghamshire contained 78·81 per cent.; in order to enable them to be compared, the results are given in the following table free of moisture :—

	Sample from Kew.	Sample from Notts.
	Per cent.	Per cent.
Organic matter* and loss on heating ...	11·30	27·71
Oxide of iron and aluminium	8·17	10·45
Lime	12·04	7·79
Magnesia, alkalies, &c.	0·97	7·05
Carbonic acid	8·85	
Phosphoric acid	0·27	0·32
Insoluble siliceous matter	58·40	46·68
Total	100	100
*Containing nitrogen	0·439	0·862
Equal to ammonia	0·533	—

It will be seen that the Kew sample in its dry state had less than half the quantity of vegetable matter (and nitrogen derived therefrom) contained in the other. It had, however, more lime and nearly as much phosphoric acid. The fact that the one sample contained so much less water than the other would make the Kew sample in its natural state the richer of the two. The quantity of lime would make it a useful material for any land where lime is needed.

Two other samples of mud from ponds in Kent are referred to in the fifth report of the Analytical Laboratory at the South-Eastern Agricultural College, Wye. Sample A was from a pond which had not been "mudded" since 1836, and as neither ditches nor drains run into it, the water supply has been kept up only by percolation through the soil which is described as a sandy clay. For many years the pond had, throughout the summer, been a mass of weeds, mainly silk weed and *Nymphaea alba*. The analysis showed this mud to contain 23·3 per cent. of water, 7·8 per cent. of organic matter, and ·183 per cent. of nitrogen.

Sample B was from an adjacent pond into which a little ditch and several drains run. It was expected that the mud would be very rich and it was used as a dressing for hops. Analysis showed, however, that the mud was little, if any, richer than the soil of the hop garden, and it had not, therefore, much value as a fertiliser.

It is mentioned in the report that "The fermentation processes going on at the bottom of a pond are very complete, organic matter is broken up into carbonic acid, marsh gas and hydrogen, and free nitrogen is probably liberated also. Resistant forms of organic matter would survive, but these have little value as manure." The analysis showed this sample to contain 52·2 per cent. of water, 7·3 per cent. of organic matter, and ·175 per cent. of nitrogen.

Generally speaking, the effect of such material is as much a physical or mechanical one as a chemical one, and if used on land of a lighter and drier texture would help in improving it. On heavy land, on the other hand, it might not be so successful. It should do very well as a top-dressing for grass.

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Various Presentations.—GARDENS.—Kew is indebted to the Honourable Walter Rothschild, F.L.S., of Tring Park, Tring, for a valuable donation of orchids, including a number of species not previously represented in the national collection. The donor has been an enthusiastic collector and grower of orchids for many years, and his interest was extended to species of purely botanical importance as well as to those possessed of attractions of a popular character. Consequently the Tring collection was reputed for the number of rarities it contained, and as the proprietor was known to dealers and collectors as a generous purchaser of new and rare orchids, Tring became a kind of emporium for them. Such genera as *Bulbophyllum*, *Cirrhopetalum*, *Megaclinium*, *Catasetum*, *Masdevallia*, *Cryptophoranthus*, *Pleurothallis*, *Angraecum*, were represented by numerous species. Among those presented to Kew are the following :—*Bulbophyllum Binnendijkii*, *B. Ericssoni*, *B. Reinwardtii*, *B. virescens*, *B. parvimentatum*, *Cirrhopetalum Rothschildianum*, *C. biflorum*, *Ancistrochilus Rothschildianus*, *Angraecum Rothschildianum*, *Lissochilus giganteus*, *L. Horsfalliae*, *Eulophiella Peetersiana*, *Mormodes badium*, *Masdevallia sororcula*, and *M. deorsa*. In addition to orchids various other plants were presented, including large masses of several species of *Doryanthes*, specially imported from Queensland, and some interesting aroids.

MUSEUMS.—Leaf, spadices and fruits of a species of *Hyphaene* from Surat, together with photographs of this tree, and of *H. thebaica*, grown at Baroda. Received from Mr. G. H. Krumbiegel, Superintendent, State Gardens, Baroda. Case 56, Museum No. II.

Acacia mollissima. Wood and bark specimens, from Mr. J. Medley Wood, A.L.S., Director, Botanic Gardens, Durban, Natal. Case 45, Museum No. I.

Dorema Ammoniacum. A sample of the gum-resin, purchased in a drug store at Biskra, Algeria. Received from Dr. Schweinfurth, per Dr. Stapf.

Series of photographs of the Karroo region, S. Africa, from Prof. M. C. Potter, Armstrong College, Newcastle.

Odontadenia speciosa. Small sample of rubber prepared from this plant, present value about 2*s.* per lb. Received from Mr. J. H. Hart, F.L.S., Superintendent, Royal Botanic Gardens, Trinidad. Case 78, Museum No. I.

Specimens from Gold Coast. Rubber from *Funtumia elastica*, coagulated with an infusion of the leaves of *Bauhinia reticulata.* Case 78, Museum No. I.

Fruits of *Landolphia senegalensis.* Case 75, Museum No. I. Fruits of *Elaeis guineensis*, var. The pericarp of the fruit yields a white oil. Case 61, Museum No. II. Received from Mr. A. E. Evans, Botanical and Agricultural Department, Gold Coast.

Mangrove (*Rhizophora Mangle*). Young plants and an aerial branched root 52 feet in length. Received from Mr. W. Crosley, Prestea, Gold Coast. Case 51, Museum No. I. and Museum No. III.

Produce from Mincing Lane. *Hevea brasiliensis*, oil from the seeds, from Ceylon. Chillies from Java. False Buchu (*Barosma pulchella* ?) from Cape Colony. *Scopolia japonica*, roots from Japan.

Jodrell Laboratory.—A portrait of Dr. D. H. Scott, F.R.S., whose retirement from the post of Honorary Keeper of the Laboratory was recorded in the *Kew Bulletin* for 1906, p. 383, having been subscribed for by botanists who have from time to time actually worked in the Laboratory, was on the afternoon of Saturday, 29th February, presented to Kew by the subscribers. It is placed in the Keeper's private room. The portrait is the work of Mr. J. Kerr-Lawson.

Library.—The Bentham Trustees have presented to the Library an excellent copy of the *Buch der Natur* of Conrad von Alemann, of Magdeburg, usually known as Conrad von Megenberg. It is a small folio of 240 leaves, including two blank, and 12 full-page woodcuts. Title-page, pagination, signatures and catch-words are all wanting, as is usually the case in books of the period to which it belongs. The full-page consists of 35 lines in one column, printed in Gothic type. The volume is dated 1482, and was published at the press of Anthonius Sorg, in Augsburg. Many of the leaves are quite uncut, and the binding of the original boards covered with stamped leather is remarkably well preserved. The *Buch der Natur* was first printed in 1475, and altogether six editions appeared in the fifteenth century, the last in 1499. According to Meyer (*Geschichte der Botanik*, iv. 198–206, 278–280) other editions with a slightly modified title were issued in 1536 and 1540, and Pritzel (*Thes. Lit. Bot.*, ed. 2, n. 6052) records an edition, edited by F. Pfeiffer, and published at Stuttgart, in 1861. From evidence which the book itself affords we gather that Alemann flourished about the middle of the fourteenth century. He himself was not the author of the work, for he acknowledges that he translated it from Latin into German. Meyer supports the opinion of Choulant that it is a very free translation of *De naturis rerum*, an unpublished manuscript of

Thomas Cantipratanus, and the results of the comparison he has made of the portions concerning plants in both works leave little doubt in the matter as to the accuracy of this view. The *Buch der Natur* is divided into 12 chapters, of which 9 and 10, comprising 55 leaves, deal with trees, shrubs and herbs. The recto of two of these leaves bears woodcuts of plants, which, though very rude, are in several instances sufficiently true to nature to admit of their identification. Amongst the herbs delineated are *Convallaria majalis*, *Ranunculus acris*, *Centaurea Cyanus* and *Viola odorata*. It is of interest to draw attention to the fact that the *Buch der Natur* is the first printed book which contains figures of plants, apart from those which appear in landscapes and arabesques in other works. The distinction of being the first book printed in Germany with figures of plants has been claimed for the extremely rare *Herbarius*, which was printed at Mainz in 1484, and of which a fine copy, presented by the Bentham Trustees in 1900, is in the Kew Library. The first edition of the *Buch der Natur* as shown above antedates the *Herbarius* by 9 years.

The Bentham Trustees have also presented two copies of *The Trees of Great Britain and Ireland*, by H. J. Elwes, F.R.S., and A. Henry, of which three volumes have so far been issued. This sumptuous work, which will include a full account of all the trees indigenous or cultivated in Great Britain and Ireland, is dedicated to the King and is provided with a preface by Sir William T. Thiselton-Dyer. It will consist of six quarto volumes, each accompanied by about sixty plates in collotype. To the botanist, forester and gardener it is a work of the utmost importance.

Sir Frank Crisp, J.P., has presented a copy of the latest edition (1907) of *La Flore de la Suisse et ses origines*, by H. Christ, translated into French by E. Tièche. It is a re-issue of the 1883 edition with a supplement of 107 pages which consists of a summary of the geo-botanical observations concerning Switzerland made during the last quarter of a century. Through the kindness of the same gentleman the Library has received a copy of *Die Hieracien der Schweiz*, by K. H. Zahn, published in 1906. It is a quarto volume of 563 pages, forming part of the *Neue Denkschriften der allgemeinen schweizerischen Gesellschaft*, Bd. xl.

Defective Oak Spoke.—Messrs. Vickers, Sons and Maxim sent a defective oak spoke to Kew in January last; their letter, together with Mr. Boodle's report, seem to be of sufficient interest for publication.

Extract from letter of Messrs. Vickers, Sons and Maxim to the Director of Kew.

We are sending you to-day by one of the carriers an Oak Spoke which has been prepared for a Gun Carriage Wheel. You will observe that the timber is full of what appears to be small buds, and we have never seen anything like it before in oak. We buy the billets of wood from timber merchants in sections of about

$4'' \times 3\frac{1}{2}'' \times 30''$ long, and each billet is carefully inspected when cleft before it is accepted on our behalf, but the buds, which are such a striking feature of the spoke sent you, were either not visible on the cleft surface, or they may have been covered over, which seems unlikely, by annular rings without buds. Each billet is carefully stamped with the place of origin and the date, but unfortunately these data were cut off the spoke in question before the peculiar characteristics were noted. We know that it is English grown, but as we buy from Somerset to Kent, we are unable to locate this particular specimen nearer than that. I should be glad to hear from you what is the cause of this peculiarity. If you think that the spoke is of any value to you to put in your show case, you are at liberty to keep it.

Report on Defective Oak Spoke.

The small "eyes" in the wood are abnormally broad medullary rays, many of which have split (presumably in drying). In some cases the broad medullary ray encloses a small ring of woody tissue, which surrounds a second medullary ray. The appearance of the wood may be compared with the "bird's-eye" structure found in stems on which there are "burrs," but in this instance it appears probable, from the structure, that a large conspicuous burr may not have been present.

The exact cause cannot be ascertained, but the most probable explanation of the structure is that the enlargement of the medullary rays was connected with the formation of adventitious roots in the bark many years before the tree was felled, the roots remaining quite small, or dying after a short time (v. Borthwick, "Adventitious roots and their relation to bird's-eye formation in the wood of various Trees," *Notes from the Royal Botanic Garden, Edinburgh*, No. XVI., Sept., 1905). Each root would be connected with a broad medullary ray, which would be continued radially in the new wood year after year, causing twisted grain in the adjacent wood. Possibly there may have been adventitious buds instead of roots. It is almost certain that the broad medullary rays must have been present at any rate on one surface of the billet, but in unplaned wood they might be inconspicuous, especially if the splits in them have become more pronounced during storage.

L. A. B.

Plants from Labrador.—In continuation of the contributions to the Flora of Labrador by Sir William MacGregor, G.C.M.G., Governor of Newfoundland, published in the *Kew Bulletin*, 1907, pp. 76–88. a further collection of plants has been received at Kew from Sir William MacGregor, through the Colonial Office.

The collection was made at the instance of the Governor, by the Rev. P. Hettasch, in the neighbourhood of Hopedale, on the coast of Labrador.

List of the plants collected by the Rev. P. Hettasch in Labrador, arranged according to Macoun's list of Labrador plants.

Anemone parviflora, *Michx.*
Ranunculus Cymbalaria, *Pursh.*
„ nivalis, *L.*
„ hyperboreus, *Rottb.*
Coptis trifolia, *Salisb.*
Papaver nudicaule, *L.*
Draba incana, *L.*,
var. arabisans, *Wats.*
Arabis alpina, *L.*
Draba fladnizensis, *Wulf.*
Cochlearia officinalis, *L.*
Lesquerella arctica, *S. Wats.*
Viola labradorica, *Schrank.*
Silene acaulis, *L.*
Lychnis apetala, *L.*
„ alpina, *L.*
Arenaria groenlandica, *Spreng.*
„ peploides, *L.*
Stellaria longipes, *Goldie*,
var. Edwardsii, *Britton.*
Stellaria *cf.* S. longipes, *Goldie.*
Cerastium alpinum, *L.*
Astragalus alpinus, *L.*
Oxytropis campestris, *L.*
Lathyrus maritimus, *Bigel.*
Rubus Chamaemorus, L.
„ arcticus, *L.*
Dryas integrifolia, *Vahl.*
Sibbaldia procumbens, *L.*
Potentilla norvegica, *L.*,
var. glabra.
Potentilla norvegica, *L.*,
var. hirsuta.
Potentilla maculata, *Poir.*
„ tridentata, *Soland.*
„ anserina, *L.*,
var. groenlandica, *Tratt.*
Potentilla litoralis, *Rydb.*
Amelanchier oligocarpa, *Roem.*
Saxifraga oppositifolia, *L.*
„ Aizoon, *Jacq.*
„ caespitosa, *L.*
„ cernua, *L.*
„ nivalis, *L.*
Parnassia palustris, *L.*
Sedum roseum, *L.*
Chamaenerium latifolium, *Sweet.*
Viburnum pauciflorum, *Pylaie.*
Linnaea borealis, *Gronov.*
Lonicera coerulea, *L.*
Solidago multiradiata, *Ait.*
Aster puniceus, *L.*
Aster sp. near A. nemoralis, *L.*
Erigeron uniflorus, *L.*
Gnaphalium norvegicum, *Gunner.*
„ supinum, *L.*
Artemisia borealis, *Pall.*
Achillea Millefolium, *Linn.*
Arnica alpina, *Murr.*
Senecio aureus, *L.* var.
„ Pseudo-Arnica, *Less.*
Taraxacum ceratophorum, *DC.*
Campanula rotundifolia, *L.*
Vaccinium uliginosum, *L.*
„ caespitosum, *Michx.*
„ Vitis-Idaea, *L.*
Arctostaphylos alpina, *Spr.*
Cassandra calyculata, *D. Don.*
Andromeda polifolia, *L.*
Loiseleuria procumbens, *Desv.*
Phyllodoce taxifolia, *Salisb.*
Kalmia glauca, *Ait.*
Ledum palustre, *L.*
„ latifolium, *Ait.*
Azalea lapponica, *Wahlenb.*
Pyrola minor, *L.*

Pyrola rotundifolia, *L.*
Moneses uniflora, *A. Gray.*
Diapensia lapponica, *Linn.*
Armeria labradorica, *Wallr.*
Primula farinosa, *L.*
„ misstassinica, *Michx.*
Gentiana sp.
Pleurogyne rotata, *Griseb.*
Menyanthes trifoliata, *L.*
Mertensia maritima, *S. F. Gray.*
Veronica alpina, *L.*
Pedicularis groenlandica, *Retz.*
„ lapponica, *L.*
„ euphrasioides, *DC.*
„ flammea, L.
Rhinanthus Crista-Galli, *L.*
Pinguicula villosa, *L.*
„ vulgaris, *L.*
Plantago borealis, *Lange.*
Polygonum viviparum, *L.*
Oxyria digyna, *Hill.*
Rumex Acetosella, *L.*
Comandra livida, *Richards.*
Alnus viridis, *DC.* (var. ?)
Salix argyrocarpa, *Anders.*
„ vestita, *Pursh.*
„ sp. near S. Uva-ursi, *Pursh.*
„ sp.
Empetrum nigrum, *L.*
Listera cordata, *R. Br.*
Spiranthes Romanzoffiana, *Cham.*
Habenaria hyperborea, *R. Br.*
„ obtusata, *Pursh.*
Streptopus amplexifolius, *DC.*
Maianthemum bifolium, *DC.*
Tofieldia palustris, *Huds.*
Luzula campestris, *DC.*
Eriophorum vaginatum, *L.*
„ Scheuchzeri, *Hoppe.*
„ angustifolium, *Roth.*
Carex capillaris, *L.*
„ rariflora, *Smith.*
„ sp. near C. vaginata, *Tausch.*
Hierochloa alpina, *R. & S.*
„ borealis, *R. & S.*
Equisetum arvense, *Linn.*
Woodsia glabella, *R. Br.*

Sterculia Alexandri.—Specimens of *Sterculia Alexandri*, Harv., including female flowers and fruit, which were hitherto undescribed, have been received from Dr. S. Schönland, Director of the Albany Museum, Grahamstown.

S. Alexandri is known only from the neighbourhood of Uitenhage, Cape Colony, where it was originally discovered in January, 1848, by Dr. R. C. Alexander Prior, "in a ravine above Klein Place." Dr. Prior collected both male and female flowers, but the latter were not seen by Harvey, who described the species in 1859 from Prior's material.*

About the year 1868, *S. Alexandri* was rediscovered† by Mr. G. W. Browning, Collector of Customs at Port Elizabeth, "in a gorge of the Van Staden's River 1–2 miles to the north of where the main road to Capetown crosses the river," and distributed in MacOwan's Plantae Austro-Africanae, No. 2058; and further material was gathered later at the same locality by Mrs. Holland and communicated to Kew in 1881 by Mr. H. Bolus.

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* Proc. Dubl. Univ. Zool. & Bot. Assoc., vol. i., p. 140, t. 15.

† The following particulars are from a manuscript note by Bolus in the Kew Herbarium.

Dr. Schönland writes as follows, in a letter dated January 24th, 1908 :—"A few weeks ago it was my good fortune to be guided by a nephew of mine, Master Norman Chase, to a locality where one of our most interesting plants grows, namely, *Sterculia Alexandri*, Harv. It grows on a farm, Kamahas, about six miles north of Uitenhage, in very steep ravines. We went there to collect the fruit, and not only got nearly ripe fruit, but also the female flowers, and as both of these seem to have been unknown hitherto I have pleasure in sending you by the same post specimens of both. We found that the fruits were not quite ripe, but as the baboons, which are plentiful, were evidently eating them rapidly, we thought it best to collect whatever we could, and not trust to the chance of finding ripe fruit later on, especially as it seems that the tree can be easily propagated by cuttings, and I am going to see what can be done in that respect.

"As the baboons were so fond of the seed, I thought I would try them for myself, and I found them to be extremely tasty. They were of a particularly agreeable nutty flavour, and . . . it seems likely that, provided the culture does not present any special difficulties, we have in this tree a plant which is well worth cultivating. I am sure that if grown in gardens it would also make a very handsome tree. In its natural state it is never more than about 20 feet in height, but the foliage is very pleasing."

The closely allied *S. Murex*, Hemsl., which is a native of the Transvaal, has seeds the size of a large grape, which are much esteemed by the natives as an article of food, and are sometimes eaten by white people. The kernel is quite like a sweet chestnut in appearance and flavour. Pigs are very fond of the seeds, and quickly get fat on them. It has been suggested that *S. Murex* is worth a trial by farmers in the lower districts of the Transvaal in any waste and rocky place where it might be difficult to get other species to grow, as the seeds would be a good substitute in pig-feeding for acorns, which cannot easily be grown in the warmer, drier parts of the country (see *Transvaal Agric. Journ.*, vol iv., p. 805).

S. Alexandri belongs to the small series *Digitatae*, K. Schum.,* which includes the following species, all of which have digitate leaves :—*S. Murex*, *S. Pexa* (Cochinchina), *S. versicolor* (Burma), *S. mexicana* (Mexico), and *S. foetida*, which occurs in India, the Malay Archipelago, and Australia.

The following description of the female flowers and fruits of *S. Alexandri* has been drawn up from the material communicated by Dr. Schönland. :—

Sterculia Alexandri, Harv. in Proc. Dubl. Univ. Zool. & Bot. Assoc., vol. i. (1859), p. 140, t. 15 ; Thes. Cap. vol. i., p. 3, t. 3 ; Fl. Cap. vol. i., p. 178 ; descriptio supplementaria (auct. *T. A. Sprague*).

Arbor usque ad 6 m. alta (teste *Schönland*). *Pedicelli* usque ad 1·5 cm longi. *Flores* ♀ :—*Calyx* luteus, intra tubum rubro-variegatus ; tubus 8 mm. altus, apice 1·5 cm. diametro ; lobi ovato-

* Engl. & Prantl., Nat. Pflanz., vol. iii., part vi., p. 96.

oblongi, 1 cm. longi, basi 7–9 mm. lati, reflexi. *Gynophorum* 8 mm. longum, pilis simplicibus puberulum. *Filamenta* 11–13, in cupulam vix 1 mm. altam extra puberulam connata, superne 0·25–0·75 mm. libera ; antherae vix 1·5 mm. longae. *Folliculi* compresso-ellipsoidei, supra applanati, circiter 8 cm. longi, 5 cm. lati, 4 cm. crassi, apice obtuse umbonati, umbone usque ad 1 cm. longo, tuberculis conicis acutis usque ad 5 mm. longis muricati, pilis stellatis brunneo-tomentelli. *Semina* 4–8 pro folliculo, late ellipsoidea, compressione angulata, ultra 2 cm. longa. *Testa* e stratis quatuor constans, quorum externum crustaceum, secundum corneum, tertium et internum carnosa. *Endospermium* alte bipartitum segmentis plano-convexis embryonem occultantibus. *Cotyledones* foliaceae, ellipticae, circiter 1·5 cm. longae, 1·2 cm. latae, radicula leviter exserta 3 mm. longa.

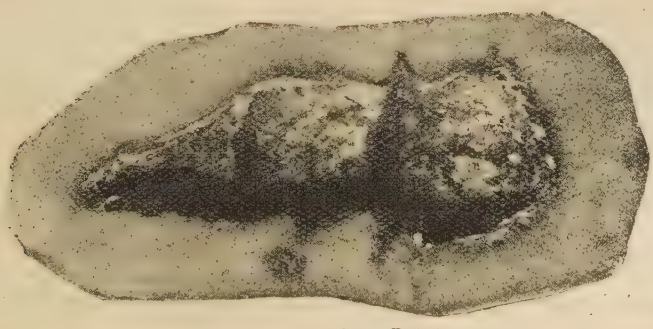
The "female" flowers of *S. Alexandri* have well-developed anthers containing an abundance of pollen, and it is possible that they are really hermaphrodite. T. A. S.

Hollow Potatoes.—During the past autumn some diseased potatoes were submitted to Kew for investigation. The potatoes were well grown and externally showed no trace of injury or disease, but when cut open were found to be hollow, an external shell, varying from a quarter to half an inch in thickness, remaining intact.

In some examples the cavity was quite empty, dry, and lined with a shrivelled mass, suggesting the previous presence of some semifluid substance that had contracted and dried up. In other cases the cavity was more or less filled with a glairy, unpleasant smelling pulp, which on microscopic examination was found to be teeming with nematodes or eelworms.

A series of sections revealed the fact that the nematodes effected an entrance into the tuber through the original point of attachment to its branch. Having once gained an entrance the nematodes gradually used up the substance of the tuber, working from the centre outwards until their progress was checked by the vascular zone which lies at some distance within the periphery.

This zone appeared in every instance to have acted as a perfect barrier to the further extension of the eelworms, hence the tissue lying between the vascular ring and the periphery of the tuber remained uninjured.



Section of Hollow Potato.

The nematode appeared to be *Aphelenchus pyri*, Bastian, a species originally found in decaying pears. Its presence in potato tubers, notwithstanding the amount of injury effected, does not necessarily prove the nematode to be a true parasite; it is at most a wound-parasite, gaining an entrance into the tuber through the minute opening formed by the decay of the tissue enclosed by the vascular ring at the point of its entrance into the tuber.

Two tubers infected at the point indicated above, by covering the scar with slime containing eelworms obtained from a diseased tuber, were placed under a bell-jar, and kept in the dark at an average temperature of 65° F. After ten days one of the tubers was cut open and revealed a cavity about one inch in diameter filled with slime containing myriads of eelworms. The second tuber was allowed to remain for a month when the internal cavity was found to have reached the limit of its extension, that is up to the vascular ring.

In a second experiment the "eyes" of two tubers were covered with nematode-bearing slime, and afterwards placed under conditions similar to those described in the previous experiment. After remaining for a month the nematodes had not effected an entry into the tuber, although in some instances small "sprouts" had pushed from the "eyes" through the slime. This experiment may be taken to prove that the nematodes cannot effect an entry through an unwounded surface, even when the tissue is quite young.

No trace of bacteria or fungi was found in the slime.

The potatoes were purchased at the Brentford market, hence their source of origin is unknown, as is also the nature of the soil in which they were grown, or the kind of manure used, &c. Judging from the large percentage of hollow tubers present in the small quantity purchased, it would appear that a local epidemic, caused by nematodes, had existed where the potatoes were grown.

The above account is not intended to convey the impression that all hollow potatoes are due to eelworms. Potatoes are often more or less completely hollowed out by centipedes, more especially by *Julus pulchellus*. In such instances however an entrance is effected by commencing at the surface and eating their way into the interior of the tuber.

G. M.

Botanical Magazine for February.—The plants figured are: *Rehmannia angulata*, Hemsl., *Codonopsis convolvulacea*, Kurz, *Pyrus Tschonoskii*, Maxim., *Potentilla concolor*, Rolfe, and *Larix Griffithii*, Hook. f. The *Rehmannia* is a handsome large-flowered Scrophulariaceous plant from Central China, introduced into cultivation a few years ago by Messrs. James Veitch & Sons. It is not quite hardy, and though probably a perennial it is most satisfactory as a garden plant when treated as a biennial. *Codonopsis convolvulacea* is a native of Eastern Asia, as indeed are all the other species of the genus, of which twenty-two are now known. This species belongs to the small section characterised by having the calyx entirely superior. The Kew plant

was presented by Mr. Max Leichtlin of Baden-Baden. Its flowers are large, broadly campanulate, and blue, with lobes ¾–1½ inches long. *Pyrus Tschonoskii* is a Japanese species, apparently rare in its native country, whence it was introduced into the Arnold Arboretum by Professor Sargent, who, in 1897, presented plants to Kew. It is peculiar on account of its erect open and rather formal habit. The Chinese *Potentilla concolor* is a new species based on *P. Griffithii*, var. *concolor*, Franch. It resembles *P. Russelliana*, a hybrid between *P. argyrophylla*, Wall., var. *atrosanguinea*, Hook. f., and *P. nepalensis*, Hook., which is figured at t. 3470, but its flowers instead of being blood-red are bright yellow. Its appearance in our gardens is due to Messrs. Bees of Ness, Neston, Cheshire, who received it from Yunnan. *Larix Griffithii* is a native of Sikkim and Bhutan. Owing to the great difficulty attending its cultivation it is still very rare in the gardens of Great Britain. The drawing was prepared from material obtained from plants at Kew, supplemented by male catkins furnished by some thriving specimens in Sir Edmund Loder's garden at Leonardslee, Horsham, Sussex.

Yeheb.—The Rev. Dr. Warre, whose interest in this subject has been recorded at p. 37 of this volume, forwards an interesting memorandum by Mr. G. G. Gilligan, an officer resident in British Somaliland, which throws some light on the doubtful points referred to in the concluding paragraph of the previous notice at p. 44. It will be seen that this memorandum, which is reproduced below, gives a third alternative spelling for the native name.

"Yehab.—Grows in the sandy soil peculiar to 'Haud.' Also found in Marehan. Grows in large quantities in good seasons. In 'Haud' found in tract of country amongst which the following places may be named :—Gerlogubi, Galadi, Galkayu, Damot. Nut ready to eat in June. Tree found on the plain (so-called, often very undulating ground). Nuts commence to appear on the bush when about 4–5 feet high; often grows into a large tree still bearing nuts. Extensively used as an article of food. They are stewed or boiled and then eaten—very nourishing and fattening—also cooked in other ways. Water in which the nuts are boiled becomes sweetened, and sometimes Somalis are fond of drinking it. Regular and plentiful rains at certain seasons of the year in the locality where Yehab grows."

The concluding remark is interesting and important in connection with the prospects of successful cultivation of Yeheb beyond the limits of Somaliland. A further note by Mr. Gilligan as to the nature of the subsoil and the range of temperature in the area in which the plant occurs is hoped for.

Adelaide Botanic Gardens.—Fifty years ago last October the Botanic Gardens at Adelaide were thrown open to the public, and the occurrence of the jubilee of this event has been made the occasion of publishing an official illustrated souvenir of the

Gardens. From this account the following brief history has been compiled. In 1854 a sum of £3,000 was voted by the Government as a first instalment for the creation of a Botanic Garden, and in 1855 Mr. Francis was appointed Secretary of the Committee and Superintendent of the Garden. Further sums of money were voted in succeeding years, and a superintendent's house, greenhouse and conservatory were built. In 1859 the first catalogue of the Garden was issued, and in the following year, owing to the growing importance of the Garden, Mr. Francis's title was altered to Director and Secretary. Collections of native plants were made about this time, and one of these, by Mr. Waterhouse, from Kangaroo Island, was of considerable value.

In 1865 Mr. Francis died and Dr. Schomburgk was appointed Director. In the following year an experimental garden and a series of Natural Order beds were laid out.

In 1868 the Victoria Regia house was erected. The plant was the first to be grown in Australia and appears to have flourished remarkably well, for "it produced in the course of six months no less than fifty-four leaves, the largest of which was 6 ft. 4 in. in diameter, and forty-one flowers nearly 13 in. in diameter. The growth of the plant was so vigorous that, notwithstanding the size of the tank in which it grew, 36 ft. by 26 ft., it became necessary to cut away two or three leaves every week in order to make room for the young ones as they came."

In 1870 the second catalogue of the Garden showed upwards of 6,000 species.

In 1874 an addition of 83 acres of land was made to the Garden for the purpose of being converted into a park and some 3,000 trees were planted; and in the same year the Palm house was built.

In 1877 a new Museum was built, and the catalogue of the Garden issued in this year showed 8,500 species in cultivation.

From 1877 to 1891 there is little of general interest to record. In 1891 Dr. Schomburgk died, having been Director of the Garden for 25 years; he was succeeded by Dr. M. Holtze, the present Director. In 1895 the old Exhibition ground came under the administration of the Garden, and in 1897 a typical orchard was started on this ground, but was transferred in the following year to Mount Lofty Ranges, near Mylor, 16 miles from Adelaide.

The Garden has suffered considerably by numerous reductions in its grant, a total reduction of £1,150 per annum having been made between 1890 and 1902. But in 1905 this state of affairs was somewhat remedied by an increase of £400 on the grant for the Garden and Park, which was maintained in 1906 and has since been increased.

St. Lucia Botanic Station.—The following brief history is taken from "Reports on the Botanic Station, Agricultural School and Experimental Plots, St. Lucia," 1906–07, issued by the Imperial Department of Agriculture for the West Indies.

"The Botanic Station was established subsequent to a tour of the West Indies by Mr. (now Sir) Daniel Morris in 1886 in connexion with a scheme for establishing Botanic Stations in the smaller islands with the view of encouraging a diversified system of cultural industries.

"In April, 1886, the people of St. Lucia addressed a memorial to the Secretary of State showing that since the settlement of the island the inhabitants had devoted themselves to the cultivation of sugar-cane almost exclusively; that causes had lately come into operation which tended to reduce the price of sugar below its cost of production; that the people of St. Lucia were eager to take up other economic crops, the cultivation of which offered reasonable prospect of profit; and that it was their firm conviction that other means of existence should be brought within reach of the people in order to lay the foundation of a more solid future prosperity.

"In October, 1886, the late Mr. John Gray, of Jamaica [formerly Head Gardener to the Right Honourable the Earl of Brownlow], was appointed Curator to undertake the work of establishing a Botanic Station. This was begun in February, 1887, on a site to the north of the Protestant Church, finally selected after an inspection of several others by the Curator and an advisory Committee appointed by the Administrator. The greater portion of the site selected was a swamp, across which it was almost impossible to pass from the Darling Road to the 'Chausses,' and which contained many years' accumulations of refuse. Lying as it did to windward of the town, it constituted a serious menance to the public health of Castries.

"Sir Daniel Morris, who had continued to take a deep interest in the foundation of a garden at Castries, visited and reported upon it in December, 1890.

"The work of reclaiming and draining the swamp and laying out and planting the grounds was gradually and successfully carried on for several years by Mr. Gray, but his health was seriously affected by the insanitary condition of the locality in which he laboured, and, after repeated attacks of illness, he died in January, 1895.

"In July, 1895, Mr. J. C. Moore, then in the employ of the Royal Gardens, Kew, was appointed Curator of the station. The reclamation of the remaining portion of the swamp in the northern part of the station was completed in 1897, and the work of draining, laying out walks and lawns, and ornamenting this part of the grounds with suitable plants was completed in 1904. It was not, however, until after the establishment of the Imperial Department of Agriculture under Sir Daniel Morris, in 1898, that many much needed improvements in the station, including water supply, fencing, buildings, better nursery accommodation, permanent labels for the plant collection, etc., etc., became possible.

"The area of the station is about 7½ acres, and although comparatively small, contains an interesting collection of plants, and is a very popular place of resort for visitors and residents. It has also done, and continues to do, good work in rendering assistance to the planting community by raising economic plants and distributing them, with information as to their cultivation.

"In 1899, Mr. G. S. Hudson was appointed to fill the post of Agricultural Instructor, whose duties were to supervise the Department's experiment work in the country districts, and to make periodical tours of the island for the purpose of encouraging and advising the planters and small proprietors on agricultural matters.

"In June, 1901, Mr. E. Buckmire, formerly an apprentice at the Botanic Station, Grenada, was appointed foreman of the station. Later in the same year, the Curator was instructed to reside at, and take charge of, the Agricultural school which was opened in October, 1901, on the Union estate about four miles from the Botanic Station, and acquired by the Government for the purpose. Subsequently, owing to the scope of the Curator's duties having considerably extended in connexion with the expansion of the work of the Imperial Department of Agriculture in the island, his title was changed to that of Agricultural Superintendent.

"In conclusion, it may be stated that the Botanic Station at Castries not only affords a place of pleasant resort for the inhabitants of Castries and visitors to the island, but it forms a valuable educational agent in showing how gardens and plants may be cultivated, and also serves as a centre for the distribution of large quantities of economic plants, such as cacao, limes, and rubber, to start new industries. In addition, it has served to get rid of an unwholesome swamp that was prejudicial to the general health of the residents in the town of Castries."

Fairy Rings.—An interesting article on the Fairy-ring fungus in Australia (*Lycoperdon polymorphum*, Vitt.), and the means of its eradication appeared in the *Agricultural Gazette* of New South Wales for August, 1907, p. 707, and the article has been reproduced in the *Journal of the Board of Agriculture* for December, 1907 (vol. xiv. p. 537). It is possible that the treatment there described may be efficacious in the eradication of 'fairy rings' on lawns in this country, and it would be of interest to learn whether any experiments have been made.